EMICON
INNOVATION AS ENERGY
AN ENEX TECHNOLOGIES COMPANY

HIGH EFFICIENCY AIR TO WATER HEAT PUMPS

LSA/HP

SERIES

TECHNICAL MANUAL

Incorporated in this document are the following:
- Declaration of conformity
- Technical manual
- Dimensional drawing

CE

Multiple instructions:
Consult the specific part

Read and understand the instructions before undertaking any work on the unit

RETAIN FOR FUTURE REFERENCE

Declaration of conformity

We declare under our own responsibility that the below equipment complies in all parts with the CEE and EN directives.
The declaration of conformity is enclosed to the technical booklet enclosed with the unit. The unit contains fluorinated greenhouse gases.

INDEX

1. INTRODUCTION

1.1 Preliminary information

Reproduction, storage or transmission of any part of this publication in any form, without the prior written consent of the Company, is prohibited.
The unit to which these instructions refer, is designed to be used for the the purposes described and to be operated in accordance with these instructions.
The Company will not be liable for claims for damage caused to persons, animals, material goods or property caused by improper installation, adjustment and maintenance or improper use. Any use not specified in this manual is prohibited.
This document is intended to provide information only and does not form a contract with third parties.
The Company pursues a policy of constant improvement and development of its products and therefore reserves the right to change the specifications and the documentation at any time, without notice and without obligation to update existing equipment.

1.2 Aim and content of the manual

These instructions are intended to provide the information required for the selection, installation, use and maintenance of the unit.
They have been prepared in accordance with the European Union laws and with the technical standards in force at the date of issue of the instructions.
The instructions contain all the necessary information to prevent any reasonably foreseeable misuse.

1.3 How to store this manual

The manual must be kept in a suitable place with easy access for users and operators, protected from dust and damp.
The manual must always accompany the unit during the entire life cycle of the same and therefore must be transferred to any subsequent user.

1.4 Manual Update

It is recommended that the manual is updated to the latest revision available.
If updates are sent to the customer they must be added to this manual.
The latest information regarding the use of its products is available by contacting the Company.

1.5 How to use this manual

The manual is an integral part of the unit.

Users or operators must consult the manual before performing any operation and especially so when transporting, handling, installating, maintaining, or dismantling the unit in order to eliminate uncertainty and reduce risk.

In these instructions symbols have been used (described in the following paragraphs) to draw the attention of operators and users to the operations that have a higher risk and which must be performed safely.

1.6 Potential Risks

Whilst the unit has been designed to minimize any risk posed to the safety of people who will interact with it, it has not been technically possible to eliminate completely the causes of risk. It is therefore necessary to refer to the requirements and symbolism below:

LOCATION OF RISK	POTENTIAL RISK	METHOD OF INJURY	PRECAUTIONS
Thermal heat exchangers.	Small stab wounds.	Contact	Avoid any contact, use protective gloves.
Fan and fan grilles.	Cuts, eye damage, broken bones.	Insertion of sharp objects through the grid while the fans are operating.	Never put objects through the protection grilles.
Internal component: compressors and discharge pipes	Burns.	Contact	Avoid any contact, use protective gloves.
Internal component: electric cables and metallic parts	Electrocution, severe burns.	Defect in the supply cable insulation, live metallic parts.	Adequate protection of power cables, ensure correct earthing of all metal parts.
External to unit: unit enclosure	Poisoning, severe burns.	Fire due to short circuit or overheating of the supply cable external to unit.	Size cables and mains protection system in accordance with iee regulations.
Low pressure safety valve.	Poisoning, severe burns.	High evaporating pressure causing a refgrigerant discharge during maintenance.	Carefully check the evaporating pressure during the maintenance operations.
High pressure safety valve.	Poisoning, severe burns, hearing loss.	Activation of the high pressure safety valve with the refrigerant circuit open.	If possible, do not open the refrigerant circuit valve; carefuly check the condensing pressure; use all the personal protective equipment required by law.
Entire unit	External fire	Fire due to natural disasters or combustions of elements nearby unit	Provide the necessary fire-fighting equipment
Entire unit	Explosion, injuries, burns, poisoning, folgoramento for natural disasters or earthquake.	Breakages, failures due to natural disasters or earthquake	Plan the necessary precautions both electrical (suitable differential magneto and electrical protection of the supply lines; greatest care during the connections of the metal parts), and mechanical (special anchors or seismic vibrations to prevent breakages or accidental falls).

1.7 General Description of Symbols Used

Safety symbols combined in accordance with ISO 3864-2:

BANNED
A black symbol inside a red circle with a red diagonal indicates an action that should not be performed.

WARNING
A black graphic symbol added to a yellow triangle with black edges indicates danger.

ACTION REQUIRED
A white symbol inserted in a blue circle indicates an action that must be done to avoid a risk.

Safety symbols combined in accordance with ISO 3864-2:

The graphic symbol “warning” is qualified with additional safety information (text or other symbols).

1.8 Safety symbols used

GENERAL RISK
Observe all signs placed next to the pictogram. The failure to follow directions may create a risk situation that may be injurious to the user.

ELECTRICAL HAZARD
Observe all signs placed next to the pictogram.
The symbol indicates components of the unit and actions described in this manual that could create an electrical hazard.

MOVING PARTS
The symbol indicates those moving parts of the unit that could create risk.

HOT SURFACES
The symbol indicates those components with high surface temperature that could create risks.

SHARP SURFACES
The symbol indicates components or parts that could cause stab wounds.

EARTH CONNECTION
The symbol identifies Earthing connection points in the unit.

READ AND UNDERSTAND THE INSTRUCTIONS
Read and understand the instructions of the machine before any operations.

RECOVER OR RECYCLE MATERIAL

1.9 Limitations and prohibited use

The machine is designed and built exclusively for the uses described in “Limitations of use” of the technical manual.
Any other use is prohibited because it may pose a potential risk to the health of operators and users.

The unit is not suitable for operations in environments:
- excessively dusty or potentially explosive atmospheres;
- where there are vibrations;
- where there are electromagnetic fields;
- where there are aggressive atmospheres

1.10 Unit identification

Each unit has a rating plate that provides key information regarding the machine.
The rating plate may differ from the one shown below as the example is for a standard unit without accessories.
For all electrical information not provided on the label, refer to the wiring diagram.
A facsimile of the label is shown below:

EMICON INNOVATION AS ENERGY
AN ENEX TECHNOLOGIES COMPANY

Manufacturer: PD322111

CE

1LSA.014A-1A Modello *Model*	123456 Matricola *Serial number*
1 Categoria PED *PED Category*	16/2017 Data di fabbricazione *Manifacture date*

R410A Tipo refrigerante *Refrigerant type*	2 Gruppo fluido *Fluid group*	2088 GWP
C1 2,6 kg C2 C3 C4 Carica refrigerante *Refrigerant charge*		5,43 ton CO_2 Equivalente *CO_2 Equivalente*
400v-3PH+N-50Hz Tensione-Fasi-Frequenza *Voltage-Phases-Frequency*	14,00 A F.L.A. (A)	6,70 kW F.L.I. (kW)

LATO BASSA PRESSIONE *LOW PRESSURE SIDE*		LATO ALTA PRESSIONE *HIGH PRESSURE SIDE*	
22,1 bar PS		41,5 bar PS	
Min -30 °C	**Max** +130 °C	**Min** -30 °C	**Max** +130 °C
Temperatura di progetto *Design temperature*		Temperatura di progetto *Design temperature*	
Peso a vuoto *Weight*			

Contiene gas fluorurati ad effetto serra disciplinati dal protocollo di Kyoto
Contains fluorinated greenhouse gasses covered by the Kyoto protocol

The product label should never be removed from the unit.

2. SAFETY

2.1 Warning re potentially hazardous toxic substances

2.1.1 Identification of the Type of Refrigerant Fluid Used: R410A

• Difluoromethane (HFC-32) 50% by weight CAS No.: 000075-10-5
• Pentafluoroethane (HFC-125) 50% by weight CAS No.: 000354-33-6

2.1.2 Identification of the Type of Oil Used.

The lubricant used is polyester oil. Please refer to the information provided on the compressor data plate.

For further information regarding the characteristics of the refrigerant and oil used, refer to the safety data sheets available from the refrigerant and oil manufacturers.

Main Ecological Information Regarding the Types of refrigerants Fluids used.

ENVIRONMENTAL PROTECTION : Read the ecological information and the following instructions carefully.

2.1.3 Persistence and degradation

The refrigerants used decompose in the lower atmosphere (troposphere) relatively quickly. The decomposed products are highly dispersible and therefore have a very low concentration. They do not influence the photochemical smog which is not among the VOC volatile organic compounds (as stipulated in the guidelines to the UNECE). The constituent refrigerants of R410A (R32, R125 and R134a), do not damage the ozone layer. These substances are regulated under the Montreal Protocol (revised 1992) and regulations EC no. 2037/200 of 29 June 2000.

2.1.4 Effects of discharges

Discharges into the atmosphere of this product does not cause a long-term contamination.

2.1.5 Exposure controls and personal protection

Wear protective clothing and gloves, protect your eyes and face

2.1.6 Professional exposure limits

R410A
HFC-32 TWA 1000 ppm
HFC-125 TWA 1000 ppm

2.2 Refrigerant handling

Users and maintenance personnel must be adequately informed about the possible risks of handling potentially toxic substances. Failure to follow such instructions can cause damage to personnel or to the unit.

2.3 Prevent inhalation of high vapor concentration

Atmospheric concentrations of refrigerant must be minimized and kept to a level that is below the occupational exposure limit. Vapor is heavier than air and can form dangerous concentrations near the ground where the ventilation rate is lower. Always ensure adequate ventilation. Avoid contact with open flames and hot surfaces as this can cause toxic and irritating decomposition products to form. Avoid contact between liquid refrigerant and the eyes or skin.

2.4 Procedures to be adopted in the event of accidental release of refrigerant

Ensure suitable personal protection (especially respiratory protection) during cleaning operations.
If deemed safe, isolate the source of the leak. If the leakage is small and if adequate ventilation is provided, allow the refrigerant to evaporate. If the loss is substantial ensure that measures are taken to adequately ventilate the area.
Contain spilled material with sand, earth or other suitable absorbent material.
Do not allow the refrigerant to enter drains, sewers or basements, as pockets of vapor can form.

2.5 Main Toxicological Information Regarding the Type of refrigerant used

2.5.1 Inhalation

A high atmospheric concentration can cause anaesthetic effects with possible loss of consciousness. Prolonged exposure may lead to irregular heartbeat and cause sudden death. Higher concentrations may cause asphyxia due to the reduced oxygen content in the atmosphere.

2.5.2 Contact with skin

Splashes of nebulous liquid can produce frostbite. Probably not hazardous if absorbed trough the skin. Repeated or prolonged contact may remove the skin's natural oils, with consequent dryness, cracking and dermatitis.

2.5.3 Contact with eyes

Splashes of liquid may cause frostbite.

2.5.4 Ingestion

While highly improbable, may produce frostbite.

2.6 First Aid Measures

Adhere scrupulously to the warnings and first aid procedures indicated below.

2.6.1 Inhalation

Move the person away from the source of exposure, keep him/her warm and let him/her rest. Administer oxygen if necessary. Attempt artificial respiration if breathing has stopped or shows sings of stopping. If the heart stops, perform external heart massage. Seek medical assistance.

2.6.2 Contact with skin

In case of contact with skin, wash immediately with lukewarm water. Thaw tissue using water. Remove contaminated clothing. Clothing may stick to the skin in case of frostbite. If irritation, swelling or blisters appear, seek medical assistance.

2.6.3 Contact with eyes

Rinse immediately using an eyewash or clean water, keeping eyelids open, for at least ten minutes. Seek medical assistance.

2.6.4 Ingestion

Do not induce vomiting. If the injured person is conscious, rinse his/her mouth with water and make him/her drink 200-300ml of water. Seek immediate medical assistance.

2.6.5 Further medical treatment

Treat symptoms and carry out support therapy as indicated. Do not administer adrenaline or similar sympathomimetic drugs following exposure, due to the risk of cardiac arrhythmia.

3. TECHNICAL CHARACTERISTICS

3.1 Unit description

The units has been designed for small and medium residential and commercial applications. They are suitable for generating chilled water at 7°C, commonly used in applications with fan coils and/or air handling units.
The units have high operating efficiencies and are quiet in operation. Differing versions and a wide range of accessories, enable the optimal solution to be selected.

3.1.1 Frame

All units are made from hot-galvanised sheet steel, painted with polyurethane powder enamel and stoved at 180°C to provide maximum protection against corrosion. The frame is self-supporting with removable panels. All screws and rivets used are made from stainless steel. The standard colour of the units is RAL 9018.

3.1.2 Refrigerant circuit

The refrigerant utilised is R410A. The refrigerant circuit is assembled using internationally recognised brand name components with all brazing and welding being performed in accordance with ISO 97/23. The refrigerant circuit includes: sight glass, filter drier, reversing valve (for reversible version only), one way valve (for reversible version only), liquid receiver (for reversible version only), Schraeder valves for maintenance and control and pressure safety device (for compliance with PED regulations).

3.1.3 Compressors

The compressor is of the rotary type (size 06 - 08) and scroll with crankcase heater and thermal overload protection by means of a klixon embedded in the motor winding. It is mounted on rubber vibration dampers and it is supplied, as standard, with a sound-proof cover in order to reduce noise in operation. Access for inspection and maintenance of the compressor is through the front panel of the unit.

3.1.4 Condenser

The condenser is made from 3/8" copper pipes and 0,1mm thick aluminium fins with the tubes being mechanically expanded into the aluminium fins in order to maximise heat transfer. Furthermore, the condenser design guarantees a low air side pressure drop thus enabling the use of low rotation speed (and hence low noise emission) fans. The condensers can be protected by a metallic filter that is available as an accessory.

3.1.5 Fans

The fans are direct drive axial type with aluminium aerofoil blades, are statically and dynamically balanced and are supplied complete with a safety fan guard complying with the requirements of EN 60335. They are fixed to the unit frame via rubber antivibration mountings. The electric motors are 6 pole type rotating at approximately 900 rpm. The motors are fitted with integrated thermal overload protection and have a moisture protection rating of IP 54.

3.1.6 Evaporators

The evaporator is a braze welded, plate type heat exchanger, manufactured from AISI 316 stainless steel. Utilisation of this type of exchanger results in a massive reduction of the refrigerant charge of the unit compared to a traditional shell-in-tube evaporator. A further advantage is a reduction in the overall dimensions of the unit. The evaporators are factory insulated with flexible close cell material and can be fitted with an antifreeze heater (accessory). Each evaporator is fitted with a temperature sensor on the discharge water side for antifreeze protection.

3.1.7 Electric enclosure

The enclosure is manufactured in order to comply with the requirements of the electromagnetic compatibility standards CEE 73/23 and 89/336. Access to the enclosure is achieved by removing the front panel of the unit. The following components are supplied as standard on all units: main switch, thermal overloads (protection of pumps and fans), compressor fuses, control circuit automatic breakers, compressor contactors, fan contactors and pump contactors. The terminal board has volt free contacts for remote ON-OFF, summer / winter change over (heat pumps only) and general alarm. For all three phase units, a sequence relay that disables the power supply in the event that the phase sequence is incorrect (scroll compressors can be damaged if they rotate in the wrong direction), is fitted as standard.

3.1.8 Microprocessors

All units are supplied with microprocessor controls loaded with ACTIVE autoadapthive strategy. The microprocessor controls the following functions: control of the water temperature, antifreeze protection, compressor timing, compressor automatic starting sequence, alarm reset, volt free contact for remote general alarm, alarms and operation LED's. If required (available as an option), the microprocessor can be configured in order for it to connect to a site BMS system thus enabling remote control and management. The technical department can

discuss and evaluate, in conjunction with the customer, solutions using MODBUS protocols. The autoadaptive control system ACTIVE is an advanced strategy that continuously monitors the temperature of the inlet and outlet water thereby determining the variation of the building thermal load. By then adjusting the outlet water temperature set point the compressor start/stop cycle can be accurately controlled thus optimizing the heat pump efficiency and maximizing the operational life of the units component's. Use of ACTIVE auto-adaptive Control enables the minimum water content to be reduced from the traditional 12-15 l/kw to 5 l/kw. A further benefit of the reduced water requirement is that units can be used in installations without a buffer tank thereby reducing the space requirements, thermal losses and costs.

3.1.9 Control and protection devices

All units are supplied with the following control and protection devices: defrost thermostat, which signals to the microprocessor control that a defrost cycle is needed and controls its termination, high pressure switch with automatic reset, compressor thermal overload protection, fans thermal overload protection.

3.2 Other versions

3.2.1 Reversible version (HP)

The reversible versions are provided with a 4 way reversing valve and are designed to produce hot water up to a temperature of 48°C. They are always supplied with a liquid receiver and a second thermostatic valve in order to optimize the efficiency of the refrigerant cycle in heating and in cooling. The microprocessor controls defrost automatically (when operating in low ambient conditions) and also the summer/ winter change over.

3.2.2 Units with integrated hydraulic kit, tank & pump (A1ZZ)

The units have available, as an option, a built in hydraulic kit that includes:
Water tank in different sizes (depending on the size of the unit) factory insulated with flexible close cell material and prepared for the installation of an antifreeze kit (option) and a water pump, centrifugal type, suitable for chilled water operation. The pump is directly controlled by the microprocessor.
The water tank is installed on the hot water outlet water side in order to minimize fluctuations in the water temperature due to the compressors cycling at part load conditions.
Also provided in the hydraulic circuit are an expansion vessel, pressure relief valve and system isolating valves with fittings.

3.2.3 Units with integrated hydraulic kit, pump no tank (A1NT-A2NT)

The units have available, as an option, a built in hydraulic kit that incorporates a water pump, centrifugal type, suitable for chilled water operation. The pump is directly controlled by the microprocessor.
Also provided in the hydraulic circuit are an expansion vessel, pressure relief valve and system isolating valves with fittings.

3.3 Accessories description

3.3.1 Low noise version (LS00)

This version includes the complete acoustic insulation of the unit (compressor + heat exchangers vanes) with compressor jackets and insulating material made with high density media and the interposition of heavy bitumen layer.

3.3.2 Rubber vibration dampers (KAVG)

To be installed beneath the unit base and the ground to avoid the transmission of vibrations (and the noise) to the building.

3.3.3 Spring vibration dampers (KAVM)

To be installed beneath the unit base and the ground to avoid the transmission of vibrations (and the noise) to the building.

3.3.4 Antifreeze heater (RAEV)

This kit, used in units without a hydraulic kit, comprises a “self-heating” electric cable that is wrapped around the user and domestic hot water exchanger (SW6 Units only) and the water circuit pipework. This device is controlled by the microprocessor.

3.3.5 Antifreeze kit (only A1 versions) (RAES)

This kit, used on units fitted with a hydraulic kit, comprises a “self-heating” electric cable that is wrapped around the user and domestic hot water exchanger (SW6 Units only), the water circuit pipework and includes an armoured electric heater that is fitted inside the water tank. This device is controlled by the microprocessor.

3.3.6 Pressure gauges (MAML)

These enable the standing charge and the operating pressures to be monitored.

3.3.7 Electronic soft starter (DSSE)

The soft starter reduces the peak starting current down to maximum 40% of the nominal peak value. The device can only be installed in the factory.

3.3.8 Remote control panel (PCRL)

This panel can be mounted up to 50m (maximum) from the unit and replicates all of the control functions. It is connected using a twin cable of 2.5 mm2 section.

3.3.9 RS485 serial interface card modbus protocol (INSE)

This controller card enables the controller to communicate with other devices on a BMS using Modbus protocol.

3.3.10 Condensate discharge drip tray with antifreeze heater (BRCA)

Installed under the finned heat exchanger, this is used to collect the condensate generated during the heating mode operation. It is fitted with trace heating to prevent ice formation in low ambient conditions. This accessory may only be factory fitted.

3.3.11 Electronic expansion valve (VTEE)

The electronic expansion valve enables the maximum possible efficiency to be achieved by maximising the evaporator heat exchange, minimising the reaction time to load variations and optimising the superheat . It is strongly recommended for use in systems that will experience large load variations.

3.3.12 Fan speed control (DCCF)

This device allows unit operation, in cooling mode, under low ambient temperature (below 20°C), by reducing condenser air flow and obtaining in this way permissible operating parameters. This device can be used as well to reduce unit sound level emission when ambient temperature is decreasing (i.e. during night time). Fan speed control is factory pre-set. The values must never be modified.

3.3.13 Partial heat recovery (RP00)

Made by a braised plates exchanger in steel inox AISI 316, that can recover around the 20% of the thermal load to the condenser.

3.3.14 Accessories availability

LSA/HP		06	08	10	14	16	21	26	31	36	41
Main switch	–	–	–	–	●	●	●	●	●	●	●
Flow switch	–	●	●	●	●	●	●	●	●	●	●
Microprocessor control	–	●	●	●	●	●	●	●	●	●	●
General alarm digital output	–	●	●	●	●	●	●	●	●	●	●
Remote on/off digital input	–	●	●	●	●	●	●	●	●	●	●
Liquid line solenoid valve	VSLI	O	O	O	O	O	O	O	O	O	O
LS low noise version	LS00	O	O	O	O	O	O	O	O	O	O
Low ambient condensing pressure control	DCCF	O	O	O	O	O	O	O	O	O	O
Partial heat recovery	RP00	-	-	-	O	O	O	O	O	O	O
Rubber anti-vibration mounts	KAVG	O	O	O	O	O	O	O	O	O	O
Spring anti-vibration mounts	KAVM	O	O	O	O	O	O	O	O	O	O
Electronic soft starter	DSSE	-	-	-	O	O	O	O	O	O	O
Evaporator antifreeze heater (basic version only)	RAEV	O	O	O	O	O	O	O	O	O	O
Antifreeze Kit (only for A version)	RAES	O	O	O	O	O	O	O	O	O	O
Refrigerant circuit pressure gauges	MAML	O	O	O	O	O	O	O	O	O	O
Condensate discharge drip tray *	BRCA	O	O	O	O	O	O	O	O	O	O
Hydraulic kit pump + tank (A1ZZ)	A1ZZ	O	O	O	O	O	O	O	O	O	O
Hydraulic kit pump no tank(A1NT)	A1NT	O	O	O	O	O	O	O	O	O	O
Remote control panel	PCRL	O	O	O	O	O	O	O	O	O	O
Serial interface card RS485	INSE	O	O	O	O	O	O	O	O	O	O
Electronic thermostatic valve	VTEE	O	O	O	O	O	O	O	O	O	O

* Condensate discharge drip tray with antifreeze heater (Only for versions HP)

● Standard, O Optional, – Not available.

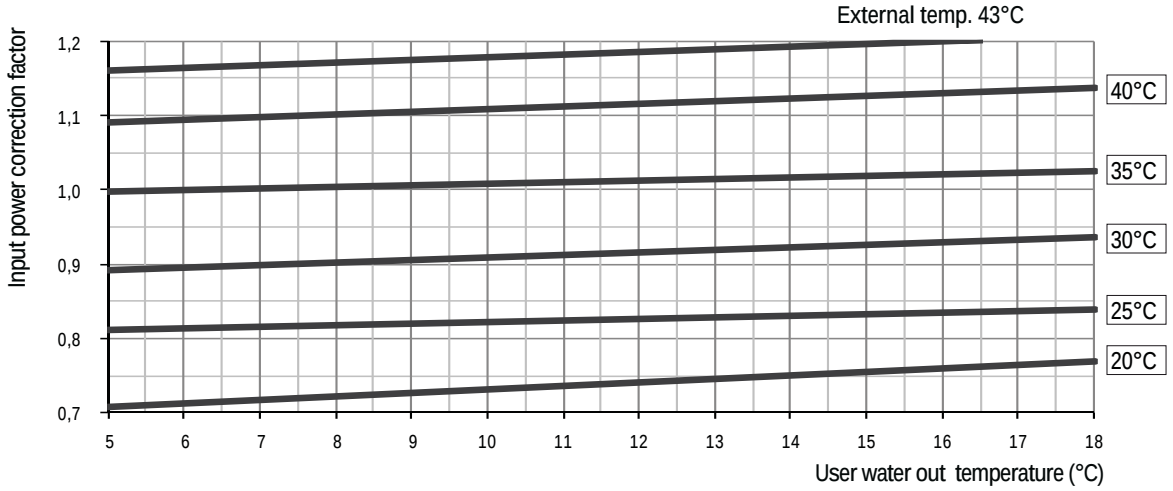
3.4 Technical data

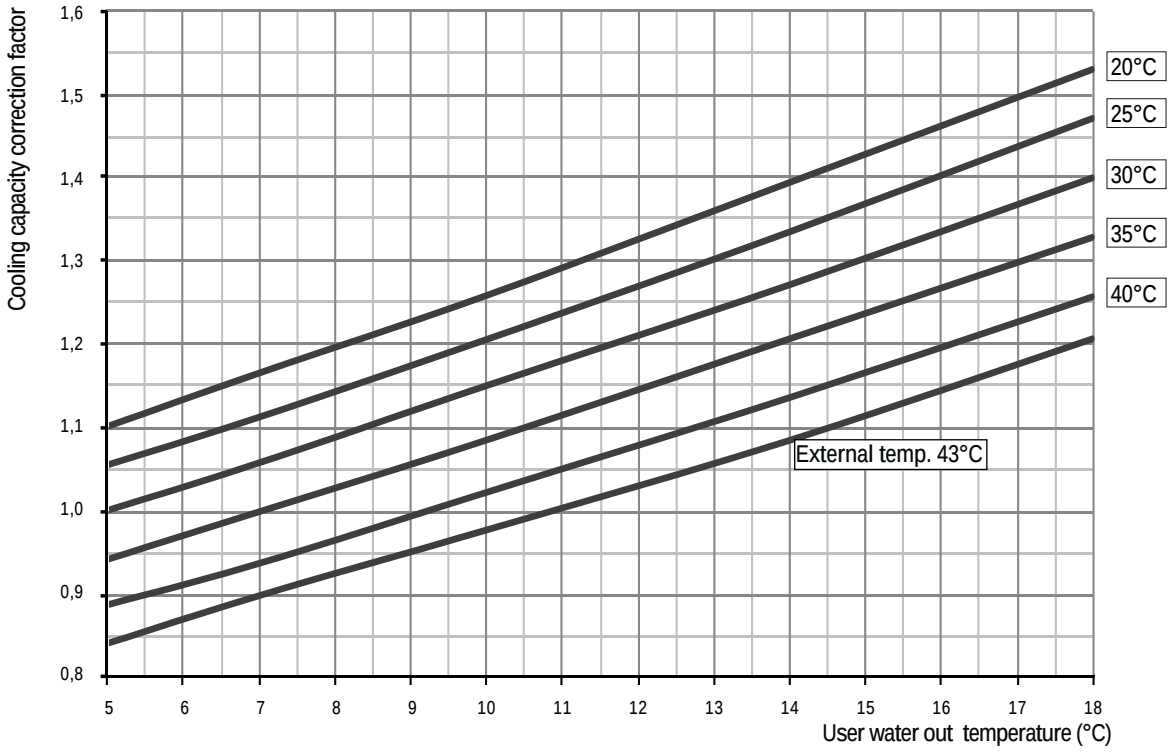
LSA/HP		06	08	10	14	16	21	26	31	36	41
Cooling capacity (EN14511) (1)	kW	5,7	7,5	8,5	14,0	15,5	20,5	26,6	30,0	33,0	39,0
Total input power (EN14511) (1)	kW	1,9	2,5	2,8	4,7	5,7	6,8	8,8	10,5	11,8	13,8
EER (EN14511) (1)	W/W	3,0	3,0	3,0	2,9	2,7	3,0	3,0	2,9	2,8	2,8
Heating capacity (EN14511) (2)	kW	5,9	7,7	9,2	14,9	17,2	22,0	29,5	33,5	36,5	44,4
Total input power (EN14511) (2)	kW	1,5	2,0	2,3	3,9	4,3	5,2	6,8	8,2	9,0	10,7
COP (EN14511) (2)	W/W	3,9	3,9	4,0	3,8	4,0	4,3	4,3	4,1	4,1	4,2
Energy Class (3)		A+	A+	A+	A+	A+	A+	A+	A+	A+	A+
SCOP (3)	kWh/kWh	3,38	3,32	3,40	3,35	3,23	3,38	3,21	3,21	3,21	3,29
ηs,h (3)	%	132,2	129,8	132,9	131,1	126,2	132,3	125,4	125,4	125,5	128,4
Power supply	V/Ph/Hz	230/1/50	230/1/50	230/1/50	400/3+N/50	400/3+N/50	400/3+N/50	400/3+N/50	400/3+N/50	400/3+N/50	400/3+N/50
Peak current	A	60,6	68,0	99,0	66,0	77,0	96,8	119,8	120,6	142,6	176,6
Max input current	A	13,4	18,1	23,0	13,3	17,0	17,8	23,8	27,6	33,6	36,6
Air flow	m^3/h	2.800	3.350	3.150	7.200	7.000	8.500	8.500	10.800	10.800	10.800
Fans	n°/kW	1 x 0,12	1 x 0,2	1 x 0,2	2 x 0,2	2 x 0,2	2 x 0,2	2 x 0,2	2 x 0,5	2 x 0,5	2 x 0,5
Compressors / Circuits	n°/n°	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1
Global warming potential (GWP)		2088	2088	2088	2088	2088	2088	2088	2088	2088	2088
Refrigerant charge	Kg	3,0	4,2	3,7	3,7	5,0	7,3	8,0	6,5	6,5	8,0
Equivalent CO_2 charge	t	6,3	8,8	7,7	7,7	10,4	15,2	16,7	13,6	13,6	16,7
Sound power (4)	dB (A)	68	68	68	69	69	74	74	79	79	79
Sound pressure (5)	dB (A)	37	37	37	38	38	43	43	47	47	47
Water pump input power	kW	0,2	0,2	0,2	0,5	0,5	0,6	0,6	0,9	0,9	1,3
Pump available static pressure (1)	kPa	56,7	56,5	45,9	109,3	109,3	136,8	79,2	96,4	41,2	170,1
Water tank volume	l	25	25	25	45	45	45	45	180	180	180

Performances are referred to the following conditions:
(1) Cooling: ambient temperature 35°C; water temperature 12/7°C.
(2) Heating: ambient temperature 7°C (DB), 6°C (WB); water temperature 30/35°C.
(3) Average conditions, low temperature, variable - Reg EU 811/2013.
(4) Sound power level in accordance with ISO 3744 (LS-Version).
(5) Sound pressure level at 10 mt from the unit in free field conditions in accordance with ISO 3744. (LS-Version).

The refrigerant data may change without notice. It is therefore necessary to refer always to the silver label placed on the unit.

3.4.1 LSA - Cooling capacity and compressors input power

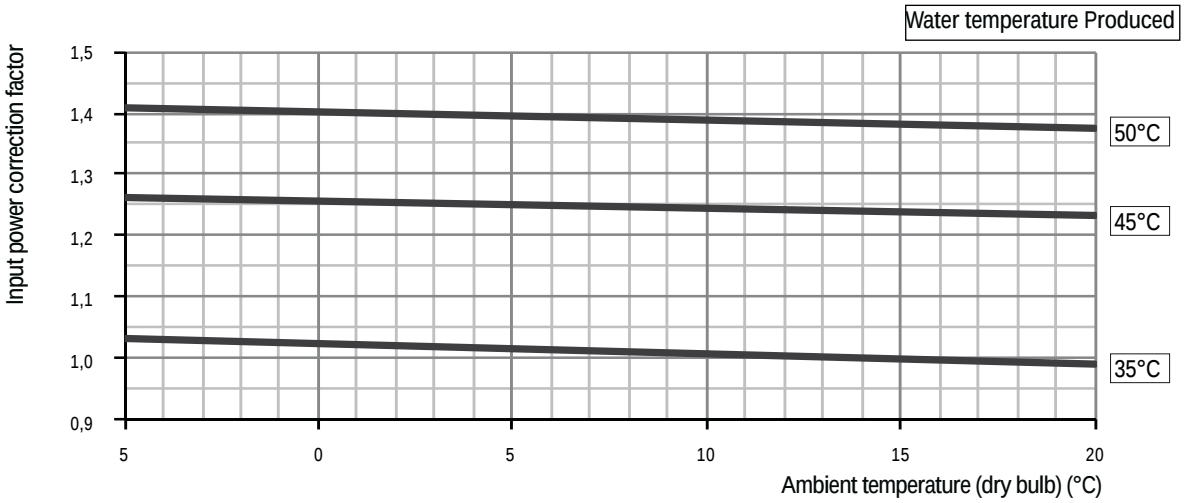


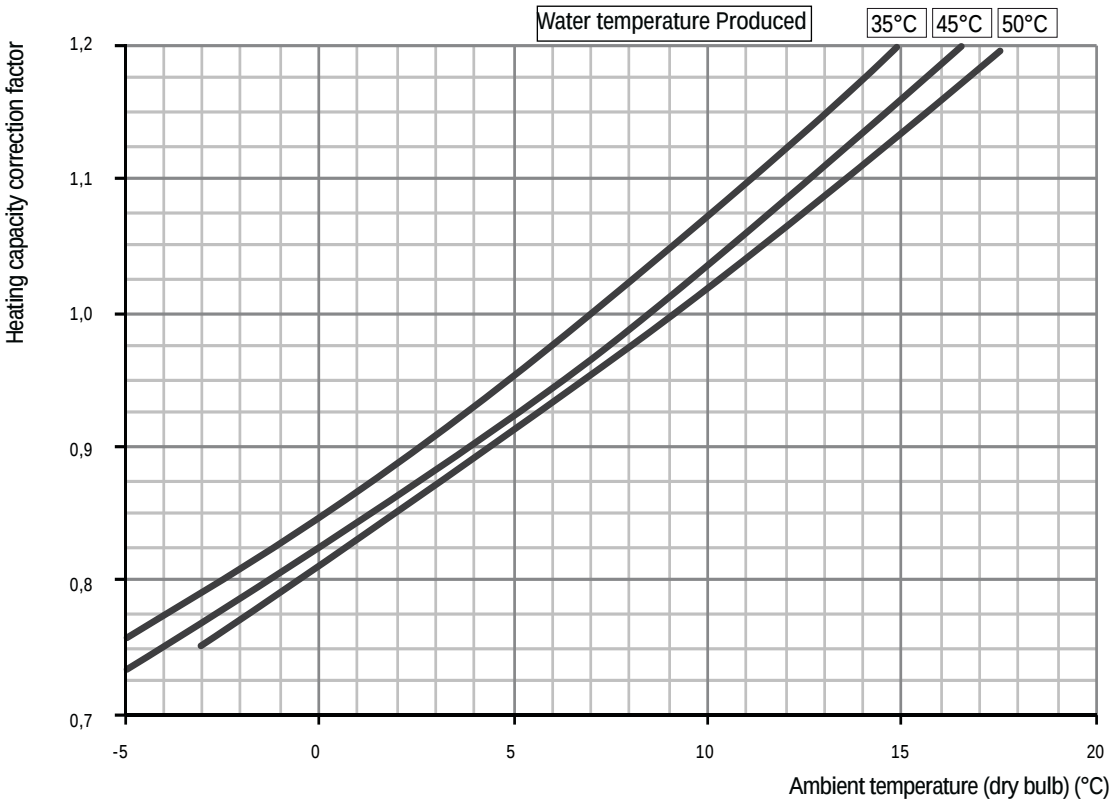


The cooling capacity of the compressor is obtained by multiplying the nominal values (PF PA), with water produced at 7 ° C, shown at page 16 and 17, for respective correction factors. For each curve, the difference between the temperature of water entering (In) and leaving (Out) the users heat exchanger is 5° C.

The data shown in the graph are generic and only intend to show the development of cooling and electrical power,in accordance with changing of working conditions. For a precise definition of the data, please refer to the Product Selection Software.

3.4.2 LSA/HP - Heating capacity and compressors input power

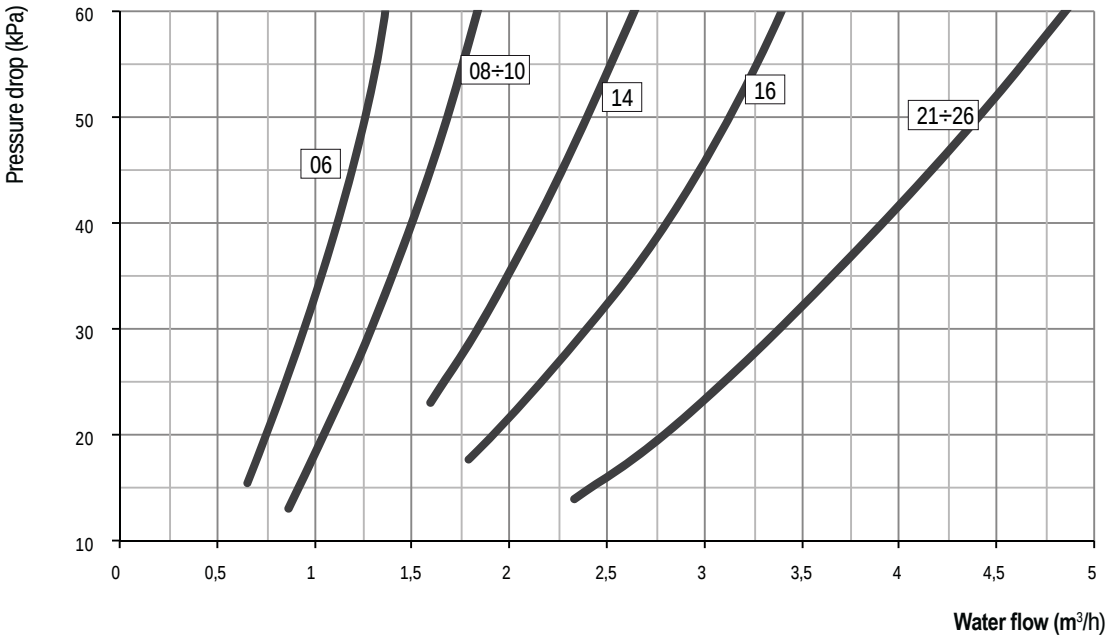


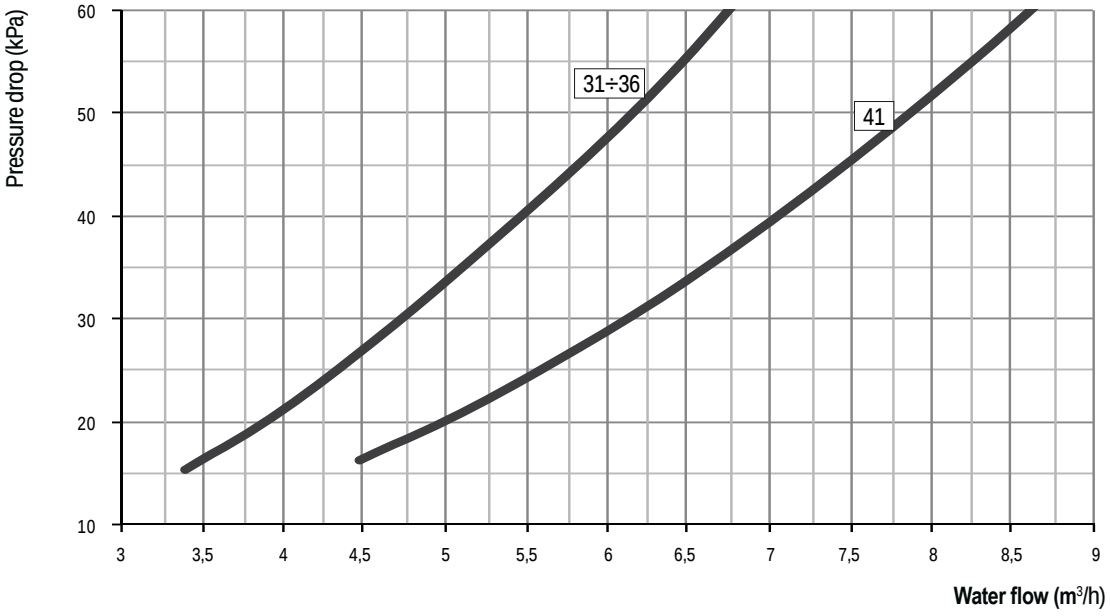


The capacity of the compressor is obtained by multiplying the nominal values (PF PA), with water produced at 7 ° C, shown at page 16 and 17, for respective correction factors. For each curve, the difference between the temperature of water entering (In)and leaving (Out) the users heat exchanger is 5° C.

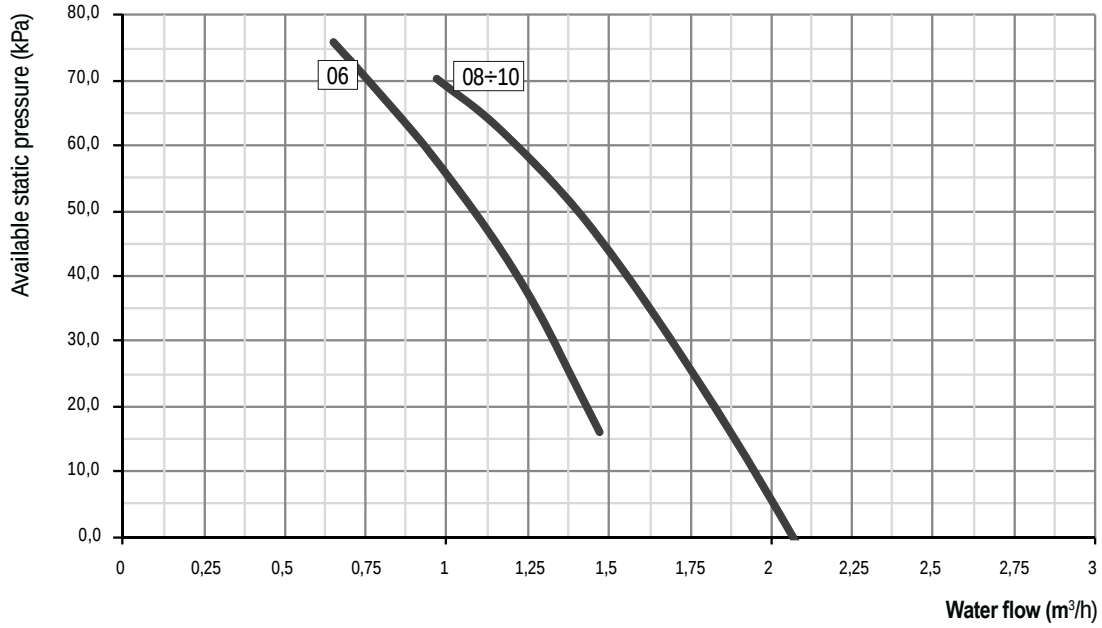
The data shown in the graph are generic and only intend to show the development of cooling and electrical power,in accordance with changing of workidryng conditions. For a precise definition of the data, please refer to the Product Selection Software.

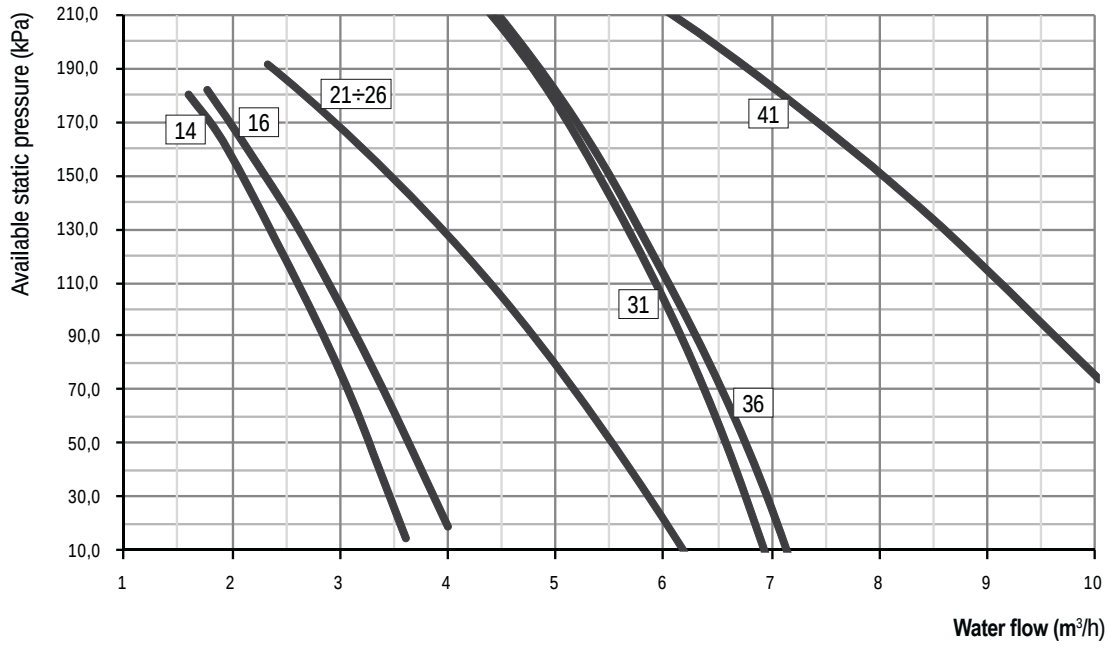
3.4.3 User heat exchanger water pressure drops



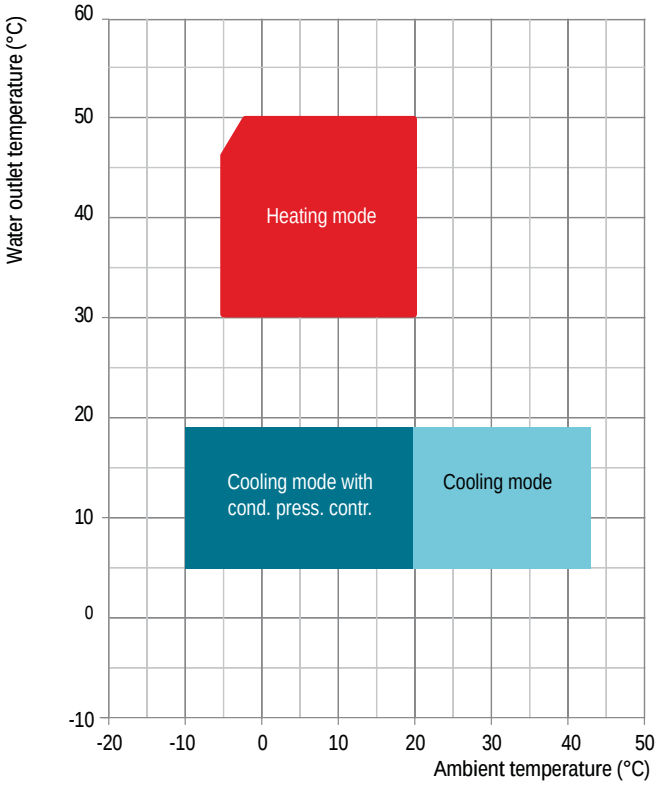


3.4.4 LSA/A1 Water pump available static pressure





3.5 Operational limits



3.5.1 User heat exchanger water flow rate

The nominal water flow rate provided, relates to a ΔT of 5°C. The maximum flow rate allowed is one that provides a ΔT of 3°C. Higher values may cause too high a pressure drop. The minimum water flow rate allowed is that which results in a ΔT of 8°C. Insufficient flow will result in evaporating temperatures that are too low leading to the operation of safety devices that will prevent unit operation.

3.5.2 User water temperature (Winter mode)

Once the system has reached set up, the temperature at the user exchanger cannot fall below 30 ° C, lower values may cause undesired operation of the compressor with the possibility of breakage. The maximum water temperature of the heat exchanger charges cannot exceed 50 ° C. On the contrary the action of the safety devices shut down the unit.

3.5.3 User water temperature (summer operation)

The minimum user water outlet temperature is 5°C. To operate below this limit requires modification of the unit. Should this be the case, please contact the technical support team for details.
The maximum user water outlet temperature is 18°C.

3.5.4 Ambient air temperature

The units are designed and manufactured to operate in heating mode with air temperatures from -5°C to 20°C.
In cooling mode the units can operate with air temperatures from -10°C to 43°C.

Units are designed and manufactured to European safety and technical standards. The units have been designed exclusively for heating and cooling. The units must be used for this specific purpose only.
The Company will not be liable for claims for damage caused to persons, animals or material goods or property caused by improper installation, adjustment and maintenance or improper use. Any use not specified in this manual is prohibited.

In case of operations outside of these values, please contact the company.

3.6 Correction tables

3.6.1 Operation with glycol

Glycol percentage	Freezing point (°C)	CCF	IPCF	WFCF	PDCF
10	-3.2	0.985	1	1.02	1.08
20	-7.8	0.98	0.99	1.05	1.12
30	-14.1	0.97	0.98	1.09	1.22
40	-22.3	0.965	0.97	1.14	1.25
50	-33.8	0.955	0.965	1.2	1.33

CCF: Capacity correction factor **IPCF: Input power correction factor**
WFCF: Water flow correction factor **PDCF: Pressure drops correction factor**

The water flow rate and pressure drop correction factors are to be applied directly to the values given for operation without glycol. The water flow rate correction factor is calculated in order to maintain the same temperature difference as that which would be obtained without glycol. The pressure drop correction factor takes into account the different flow rate obtained from the application of the flow rate correction factor.

3.6.2 Correction tables different Δt

Water temperature diff.(°C)	3	5	8
CCCP	0.99	1	1.02
IPCF	0.99	1	1.01

CCCP = Cooling capacity correction factor IPCF = Input power correction factor

3.6.3 Correction tables different Fouling factors

Fouling factor	0.00005	0.0001	0.0002
CCCP	1	0.98	0.94
IPCF	1	0.98	0.95

CCCP = Cooling capacity correction factor IPCF = Input power correction factor

3.7 Sound data

LOW NOISE VERSION (LS)											
Modd.	Octave bands (Hz)								Lw		Lp
	63	125	250	500	1K	2K	4K	8K	dB	dB(A)	dB(A)
	dB	dB	dB	dB	dB	dB	dB	dB			
06	81,1	72,3	66,2	64,7	63,6	58,2	54,8	45,7	81,9	68	37
08	81,1	72,3	66,2	64,7	63,6	58,2	54,8	45,7	81,9	68	37
10	81,1	72,3	66,2	64,7	63,6	58,2	54,8	45,7	81,9	68	37
14	82,1	73,3	67,2	65,7	64,6	59,2	55,8	46,7	82,9	69	38
16	82,1	73,3	67,2	65,7	64,6	59,2	55,8	46,7	82,9	69	38
21	87,1	78,3	72,2	70,7	69,6	64,2	60,8	51,7	87,9	74	43
26	87,1	78,3	72,2	70,7	69,6	64,2	60,8	51,7	87,9	74	43
31	92,1	83,3	77,2	75,7	74,6	69,2	65,8	56,7	92,9	79	47
36	92,1	83,3	77,2	75,7	74,6	69,2	65,8	56,7	92,9	79	47
41	92,1	83,3	77,2	75,7	74,6	69,2	65,8	56,7	92,9	79	47

Lw: Sound power level in accordance with ISO 3744 (LS-Version).
Lp: Sound pressure level at 10 mt from the unit in free field conditions in accordance with ISO 3744. (LS-Version).

The sound pressure level of the STANDARD VERSIONS without compressor jackets and compressor vane insulation is approx. 1,5 dB(A) higher than the equivalent low noise versions LS.

4. INSTALLATION

4.1 General safety guidelines and and use of symbols

Before undertaking any task the operator must be fully trained in the operation of the machines to be used and their controls. They must also have read and be fully conversant with all operating instructions.

All maintenance must be performed by TRAINED personnel and be in accordance with all national and local regulations.

The installation and maintenance of the unit must comply with the local regulations in force at the time of the installation.

Avoid contact and do not insert any objects into moving parts.

4.2. Health and safety Considerations

The workplace must be kept clean, tidy and free from objects that may prevent free movement. Appropriate lighting of the work place shall be provided to allow the operator to perform the required operations safely. Poor or too strong lighting can cause risks.

Ensure that work places are always adequately ventilated and that respirators are working, in good condition and comply fully with the requirements of the current regulations.

4.3 Personal protective equipment

When operating and maintaining the unit, use the following personal protective equipment listed below as required by law.

Protective footwear.

Eye protection.

Protective gloves.

Respiratory protection.

Hearing protection.

4.4 Inspection

When installing or servicing the unit, it is necessary to strictly follow the rules reported on this manual, to conform to all the specifications of the labels on the unit, and to take any possible precautions of the case. Not observing the rules reported on this manual can create dangerous situations. After receiving the unit, immediately check its integrity. The unit left the factory in perfect conditions; any eventual damage must be questioned to the carrier and recorded on the Delivery Note before it is signed. The company must be informed, within 8 days, of the extent of the damage. The Customer should prepare a written statement of any severe damage.

Before accepting the unit check:
- The unit did not suffer any damage during transport;
- The delivered goods are conforming to what shown in the delivery note.

In Case of Damage
- List the damage on the delivery note
- Inform the Company of the extent of the damage within 8 days of receipt of the goods. After this time any claim will not be considered.
- A full written report is required for cases of severe damage.
- Take digital photographs.

4.5 Storage

Units should be stored under cover and ideally, should remain in their packaging. The tools that are supplied for opening the electrics box should be formally transferred to the person responsible for the plant.

4.6 Unpacking

Packaging could be dangerous for the operators.

It is advisable to leave packaged units during handling and remove it before the installation.
The packaging must be removed carefully to prevent any possible damage to the machine.
The materials constituting the packaging may be different in nature (wood, cardboard, nylon, etc.).

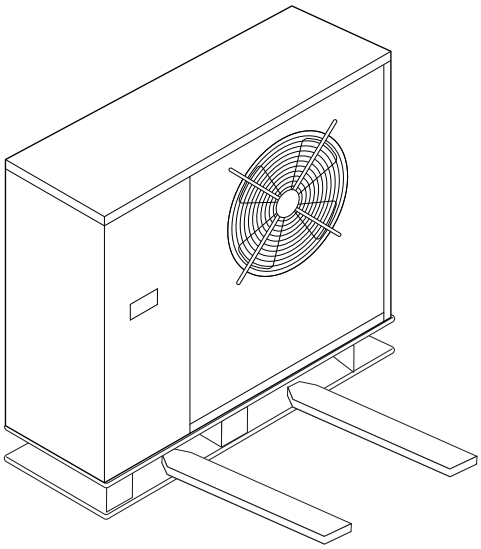
The packaging materials should be separated and sent for disposal or possible recycling to specialist waste companies.

4.7 Lifting and handling

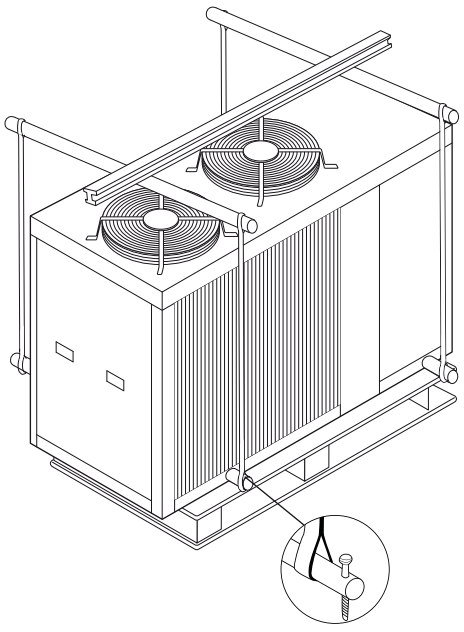
When unloading the unit, it is strongly recommended that sudden movements are avoided in order to protect the refrigerant circuit, copper tubes or any other unit component. Units can be lifted by using a forklift or, alternatively, using belts. Take care that the method of lifting does not damage the side panels or the cover. It is important to keep the unit horizontal at all time to avoid damage to the internal components.

The Source heat exchangers fins are sharp. Use protection gloves.

LSA 06 ÷ 26



LSA 31 ÷ 41

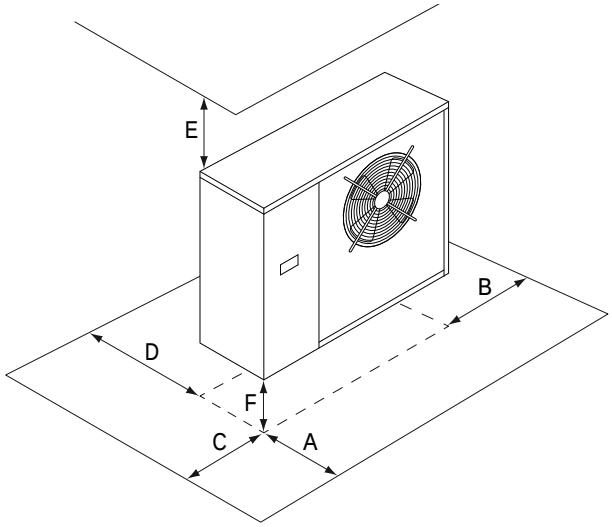


4.8 Location and minimum technical clearances

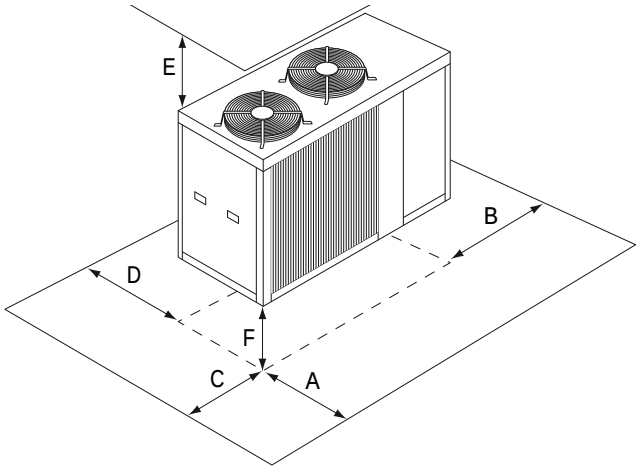
The unit has to be installed such that maintenance and repair is possible. The warranty does not cover costs for the provision of lifting apparatus, platforms or other lifting systems required to perform repairs during warranty period.

The installation site should be chosen in accordance with EN 378-1 and 378-3 standards. When choosing the installation site, all risks caused by accidental refrigerant leakage should be taken into consideration.

All units are designed for indoor installation. It is advisable to create a proper basement, with a size similar to unit foot-print. Unit vibration level is very low: it is advisable however, to fit a rigid rubber band between basement and unit base-frame. If it is the case, it is possible to install anti-vibration mounts (spring or rubber), to keep vibrations at a very low level. Absolute care must be taken to ensure adequate air volume to the condenser. Re-circulation of discharge air must be avoided; not observing this point will result in poor performance or activation of safety controls. For these reasons it is necessary to observe the following clearances:



Mod.	A	B	C	D	E	F
06	2000	500	500	500	500	350
08	2000	500	500	500	500	350
10	2000	500	500	500	500	350
14	2500	500	500	500	500	350
16	2500	500	500	500	500	350
21	2500	500	500	500	500	350
26	2500	500	500	500	500	350

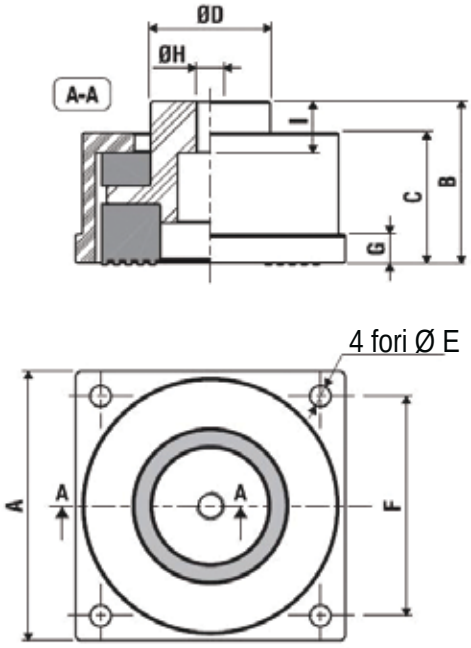


Mod.	A	B	C	D	E	F
31	1000	800	800	800	3000	350
36	1000	800	800	800	3000	350
41	1000	800	800	800	3000	350

All reversible units, during defrost mode, produce condensate at the base of the source heat exchanger. If the ambient temperature is below 0°C the water may freeze, creating a thick layer of ice within the unit.

4.9 Installation of rubber vibration dampers (KAVG)

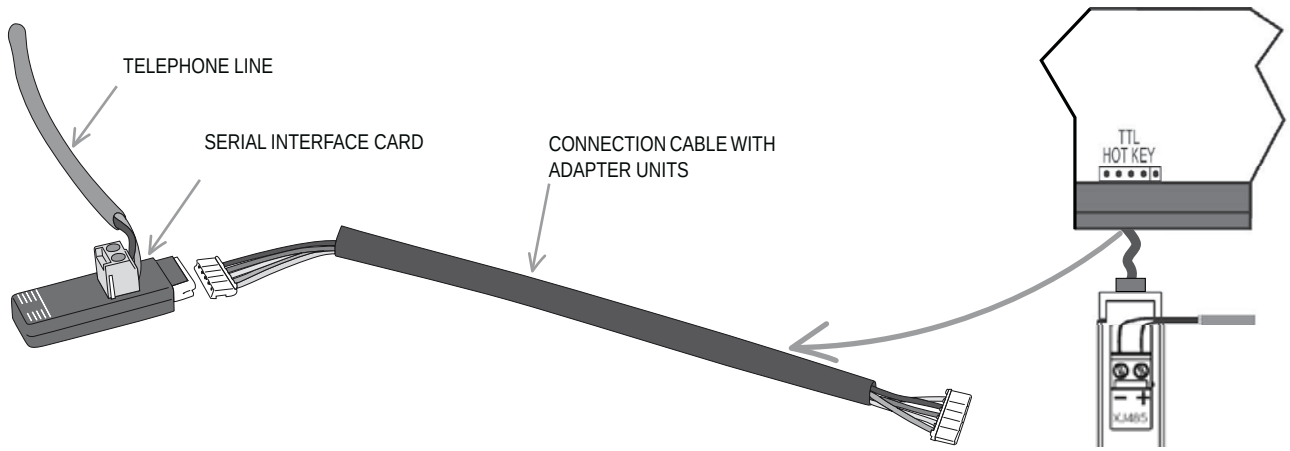
All units should be installed on vibration dampers in order to prevent the transmission of vibration to the supporting surface and reduce the noise level. Rubber vibration dampers are available as an option in the catalogue. The vibration dampers (optional) are supplied by the factory in seperate packaging.



Mod.	A	B	C	ΦD	ΦE	F	G	H	I
LSA/HP 06÷10	52	36	27	23	5	42	5	M8	30
LSA/HP 14÷41	65	48	36	30	6	52	8	M10	38

4.10 Serial interface card RS485 (INSE)

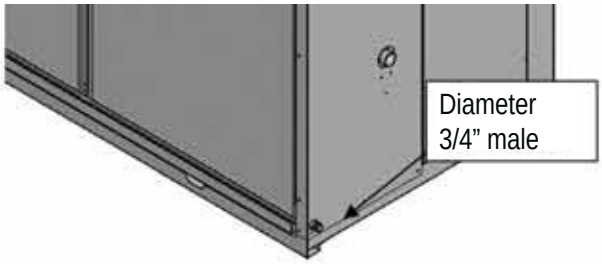
Supervision system interface serial board (MODBUS RS485 available only)
The installation of the card will allow the unit to be plugged in and connected to a system with MODBUS protocol. This system allows you to remotely monitor all parameters of the unit and change their values.
The serial interface board is normally fitted at the factory, where it is provided separately is necessary to respect the polarity of the wiring as shown in the diagram. Any reversal of polarity will result in the non-functioning unit. The supervision connectivity cable must be telephone one type 2x0, 25 mm2.
The unit is configured at the factory with serial address 1. In case of using the MODBUS system, you can request the list of variables by contacting the assistance.



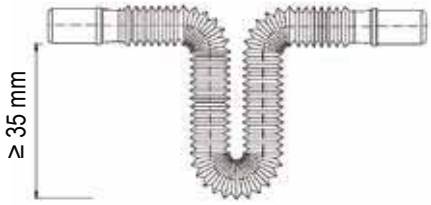
4.11 Installation of condensate drip tray (BRCA) (Only for reversible units HP)

In heating and domestic hot water mode, the unit can produce a quantity of condensate, depending upon the ambient conditions and the working hours. The standard unit has a gap between the bottom of the coil and the base frame to allow the condensate to flow through. This condensate may freeze in severe ambient conditions. The unit must therefore be installed in such a way as to prevent a slipping hazard to the user or third parties due to the presence of ice around the heat pump.

To control the discharge of the condensate generated by the heat pump, it is possible to install (as option) a drip tray that, positioned underneath the source heat exchanger (finned coil) and above the base frame, recovers all water generated by the unit when in heating and domestic hot water working mode. The drip tray is supplied with a self-heating antifreeze kit that melts the any ice present in the drip tray. The drip tray is supplied with a discharge connection that must be connected to a discharge pipe.



The condensate drain line should have a water trap which may have minimum flying height equal to the suction of the fan, in any case never less than 35 mm.



It is recommended that a heating cable be installed in the condensate drip tray discharge pipe to prevent freezing of the water inside the pipe itself, as this can lead to a malfunction of the unit.

The heating cable that is to be inserted in the discharge pipe must have a protection degree IP67 with a specific heating capacity of a minimum of 35W per linear metre. It is also recommended that the discharge pipe be insulated with closed cell type insulation having a minimum thickness of 15 mm.

4.12 Hydraulic connections

The water pipe-work must be installed in accordance with national and local regulation and can be made from copper, steel, galvanized steel or PVC. The Pipework must be designed to cater for the nominal water flow and the hydraulic pressure drops of the system, a maximum pressure drop of 300 Pa/m run being typical. All pipes must be insulated with closed-cell material of adequate thickness. The hydraulic piping should includes:

- Pockets for temperature sensor to measure the temperature in the system.
- Flexible joints, to isolate the unit from the rest of the system
- Temperature and pressure gauges for maintenance and servicing operations.
- Shut-off manual valves to isolate the unit from the hydraulic circuit.
- Metallic filters to be mounted on the inlet pipe with a mesh not larger than 1 mm.
- Vent valves, expansion tank with water filling, discharge valve.

System return water must be fitted to the connection labelled: "USER WATER IN" as incorrect connection can damage the heat exchanger by freezing.

It is compulsory to install on the USER WATER IN connection, a water strainer with a mesh not larger than 1 mm. Fitting this filter is COMPULSORY and the warranty will be invalidated if it is removed. The filter must be kept clean and checked periodically.

All units are factory supplied with a flow switch; the flow switch MUST BE FITTED in the pipework connection labelled “USER WATER OUT”. If the flow switch is altered, removed, or the water filter omitted on the unit, the warranty will be invalidated.

The water flow through the heat exchangers of the unit should not be fall below Δt 8°C measured at the following conditions:

Heating mode: 7°C Dry bulb ambient temperature 35°C water outlet temperature
Cooling mode: 35°C dry bulb ambient temperature 7°C water outlet temperature

4.13 Chemical characteristics of the water

The system is to be filled with clean water and vented after a full flushing operation has been performed; the water should have the following characteristics :

PH	6-8	Total Hardness	Lower Than 50 ppm
Electric conductibility	Lower Than 200 mV/cm (25°C)	Sulphur ion	None
Chlorine ions	Lower Than 50 ppm	Ammonia ion	None
Sulphuric acid ions	Lower Than 50 ppm	Silicon ion	Lower Than 30 ppm
Total Iron	Lower Than 0.3 ppm		

4.14 User circuit minimum water content

Air-to-water chillers require a minimum water content in the user hydraulic circuit to guarantee correct operation and to avoid excessive cycling of the compressors that can reduce the working life of the unit.

Model	06	08	10	14	16	21	26	31	36	41
Minimum water content (l)	30	40	45	70	80	100	140	150	170	200
Safety valve (bar)	6	6	6	6	6	6	6	6	6	6
Tank water content (only A1ZZ) (l)	25	25	25	45	45	45	45	180	180	180

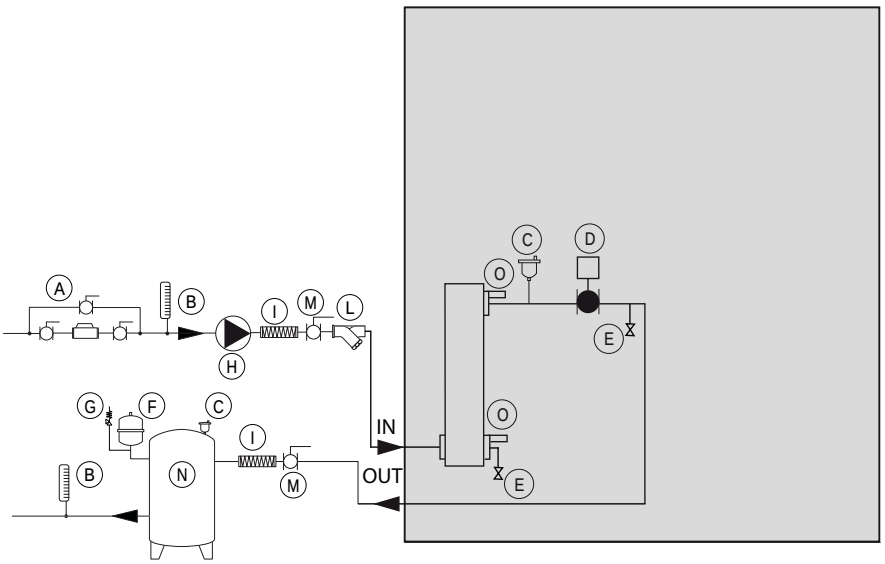
4.15 Expansion tank technical data

The expansion vessel supplied with the units (Version A and ANT only) is sized for the water content of the unit only. Any additional expansion vessel should be sized by the installer depending on the layout of the system.

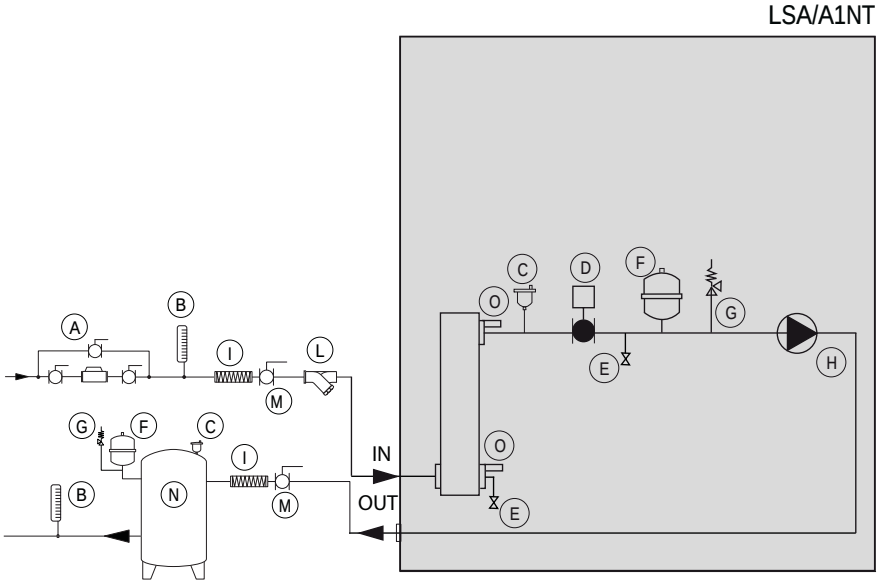
Modello	06	08	10	14	16	21	26	31	36	41
Volume (l)	2	2	2	2	2	5	5	8	8	8
Pre-carica (bar)	3.5	3.5	3.5	3.5	3.5	2.5	2.5	2.5	2.5	2.5
Pressione massima vaso espansione (bar)	10	10	10	10	10	10	10	10	10	10

4.16 Hydraulic components

LSA



LSA/A1NT

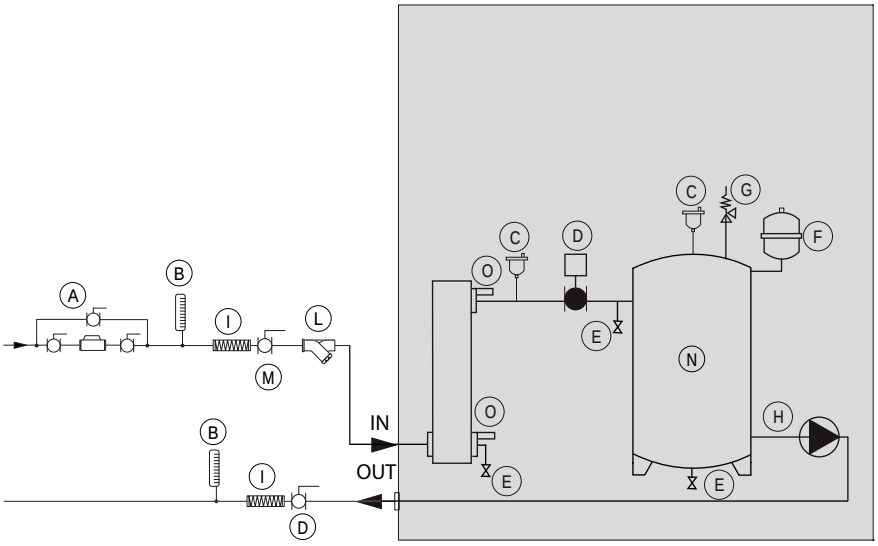


A	System Filling Group	H	Water Pump
B	Thermometer	I	Flexible Connection
C	Vent Valve	L	Water Strainer
D	Flow Switch	M	Ball Shut-off Valve
E	Drainage valve	N	Water tank
F	Expansion Vessel	O	Temperature water sensor
G	Safety Valve		

Note: Components shown inside the grey box are factory fitted; components outside the grey box have to be supplied and fitted by the installer.

If the unit is supplied without a pump, the pump must be installed with the supply side toward the water inlet connection of the unit.

LSA/A1



A	System Filling Group	H	Water Pump
B	Thermometer	I	Flexible Connection
C	Vent Valve	L	Water Strainer
D	Flow Switch	M	Ball Shut-off Valve
E	Drainage valve	N	Water tank
F	Expansion Vessel	O	Temperature water sensor
G	Safety Valve		

Note: Components shown inside the grey box are factory fitted; components outside the grey box have to be supplied and fitted by the installer.

If the unit is supplied without a pump, the pump must be installed with the supply side toward the water inlet connection of the unit.

4.17 Filling the hydraulic circuit

• Before filling, check that the system drain valve is closed.
• Open all pipework, heat pump and terminal unit air vents.
• Open the shut off valves.
• Begin filling, slowly opening the water valve in the filling group outside the unit.
• When water begins to leak out of the terminal unit air vents, close them and continue filling until the pressure gauge indicates a pressure of 1.5 bar.

The installation should be filled to a pressure of between 1 and 2 bars. It is recommended that this operation be repeated after the unit has been operating for a number of hours (due to the presence of air bubbles in the system). The pressure of the installation should be checked regularly and if it drops below 1 bar, the water content should be topped-up. If frequent top-ups are required, check all connections for leaks.

4.18 Emptying the installation

• Before emptying, place the mains switch in the “Off” position.
• Make sure the filling group valve is closed.
• Open the drainage valve outside the unit and all the installation and terminal air vent valves.

If the fluid in the circuit contains anti-freeze, it MUST not be allowed to run away to drain. It must be collected for possible re-cycling or for correct disposal.

4.19 Electric connections: preliminary safety information

The electric panel is located inside the unit at the top of the technical compartment where the various components of the refrigerant circuit are also to be found. To access the electrical board, remove the front panel of the unit:

Power connections must be made in accordance to the wiring diagram enclosed with the unit and in accordance to the norms in force.

Make sure the power supply upstream of the unit is (blocked with a switch). Check that the main switch handle is padlocked and it is applied on the handle a visible sign of warning not to operate.

It must be verified that electric supply is corresponding to the unit electric nominal data (tension, phases, frequency) reported on the label in the front panel of the unit.

Power cable and line protection must be sized according to the specification reported on the form of the wiring diagram enclosed with the unit.

The cable section must be commensurate with the calibration of the system-side protection and must take into account all the factors that may influence (temperature, type of insulation, length, etc.).

Power supply must respect the reported tolerances and limits: If those tolerances should not be respected, the warranty will be invalidated.

Flow switches must be connected following the indication reported in the wiring diagram. Never bridge flow switches connections in the terminal board. Guarantee will be invalidated if connections are altered or not properly made.

Make all connections to ground provided by law and legislation.

Before any service operation on the unit, be sure that the electric supply is disconnected.

FROST PROTECTION
If opened, the main switch cuts the power off to any electric heater and antifreeze device supplied with the unit, including the compressor crankcase heaters. The main switch should only be disconnected for cleaning, maintenance or unit reparation.

4.20 Electric data

The electrical data reported below refer to the standard unit without accessories.
In all other cases refer to the data reported in the attached electrical wiring diagrams.

The line voltage fluctuations can not be more than ±10% of the nominal value, while the voltage unbalance between one phase and another can not exceed 1%, according to EN60204. If those tolerances should not be respected, please contact our Company.

Model		06	08	10	14	16
Power supply	V/~/Hz	230/1/50	230/1/50	230/1/50	400/3+N50	400/3+N50
Control board	V/~/Hz	24 V	24 V	24 V	24 V	24 V
Auxiliary circuit	V/~/Hz	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50
Fans power supply	V/~/Hz	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50
Line section	mm^2	1,5	4	4	4	4
PE section	mm^2	1,5	4	4	4	4

Model		21	26	31	36	41
Power supply	V/~/Hz	400/3+N/50	400/3+N/50	400/3/50	400/3/50	400/3/50
Control board	V/~/Hz	24 V	24 V	24 V	24 V	24 V
Auxiliary circuit	V/~/Hz	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50
Fans power supply	V/~/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Line section	mm^2	6	6	10	10	16
PE section	mm^2	6	6	10	10	16

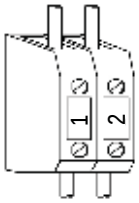
Electric data may change for updating without notice. It is therefore necessary to refer always to the wiring diagram present in the units.

4.21 Electric connections

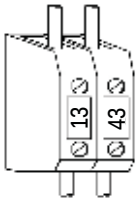
The numbering of the terminals may change without notice. For their connection is mandatory to refer to the wiring diagram supplied along with the unit.

4.21.1 Remote wiring connections (opzional)

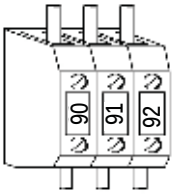
All terminals referred to in the explanations below will be found on the terminal board inside the electrical box. All electric connections mentioned below have to be made by the installer, on site.



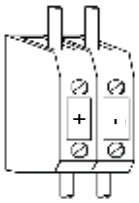
REMOTE ON / OFF
To switch the unit on or off remotely, the cable jumper connected across terminals 1 and 2 must be replaced with a switch.
Contact closed, unit ON,
Contact open, unit OFF.



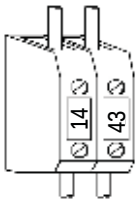
REMOTE SUMMER / WINTER CHANGE OVER
To remotely switch the unit from heating to cooling, the cable jumper connected across terminals 13 and 43 must be replaced with a switch.
Contact closed, unit in Winter mode,
Contact open, unit Summer mode.



REMOTE GENERAL ALARM
For remote display of a general alarm, connect the visual or audible device between terminals 90-91-92.
Contacts 90/91 NC (Normally closed)
Contacts 91/92 NO (Normally opened)



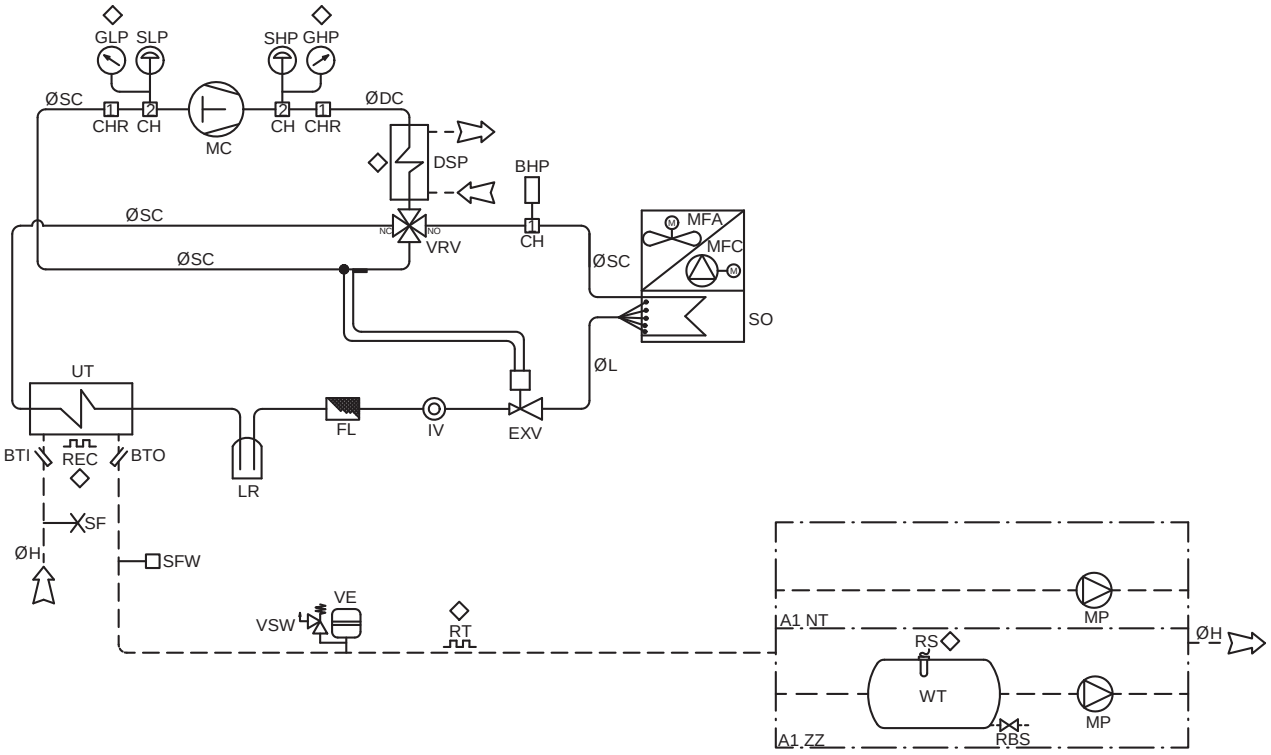
REMOTE CONTROL PANEL
The remote control panel replicates all of the functions on the main controller panel and can be connected up to a maximum distance of 50 meters from the unit. The panel has to be connected to the unit by 2 wires having diameter 0.75 mm2. The power supply cables must be separated from the remote control panel wires, in order to avoid interference. The control panel has to be connected to the terminals + and –. The control panel cannot be installed in an area subject to excessive vibration, corrosive gases, is a dirty environment or has a high humidity level. The ventilation openings must not be blocked.



USER CIRCUIT FLOW SWITCH (SFW1)
This is used to protect the unit if there is a low water flow rate in the user circuit. It is factory fitted across terminals 14 and 43.

4.22 Refrigerant circuit layout

4.22.1 Refrigerant circuit layout HP version



A1NT	One pump without water tank	MFC	Centrifugal fan
A1ZZ	One pump with water tank	MP	Pump
BHP	High pressure transducer	RBS	Discharge valve
BTI	User water input probe	REC	Exchangers heating
BTO	User water output probe	RS	Tank resistance
CH	Charging plug	RT	Pipes resistance
CHR	Charging plug 5/16 sae (R410)	SF	Water vent
DSP	Desuperheater	SFW	Water flow switch
EXV	Termostatic valve	SHP	High pressure pressostat
FL	Liquid line filter	SLP	Low-high pressure switch
GHP	High pressure gauge	SO	Source side
GLP	Low pressure gauge	UT	User side
IV	Moisture indicator sight glass	VE	Expansion vessel
LG	Liquid gas distributor	VRV	Reverse cycle valve
LR	Liquid receiver	VSW	Water safety valve
MC	Compressor	WT	
MFA	Axial fan		

5. UNIT START UP

5.1 Preliminary checks

Before starting the unit the checks detailed in this manual of the electric supply and connections, the hydraulic system and the refrigerant circuit, should be performed.

Start-up operations must be performed in accordance with the instructions detailed in the previous paragraphs.

If it is required to switch the unit on and off, never do this using the main isolator: this should only be used to disconnect the unit from the power supply when the unit is to be permanently off. Isolation will result in no supply for the crankcase heater and on start up the compressor could be seriously damaged.

5.1.1 Before start-up

Damage can occur during shipment or installation. It is recommended that a detailed check is made, before the installation of the unit, for possible refrigerant leakages caused by breakage of capillaries, pressure switch connections, tampering of the refrigerant pipework, vibration during transport or general abuse suffered by the unit.

- Verify that the unit is installed in a workmanlike manner and in accordance with the guidelines in this manual.
- Check that all power cables are properly connected and all terminals are correctly fixed.
- The operating voltage between phases R S T is the one shown on the unit labels.
- Check that the unit is connected to the system earth.
- Check that there is no refrigerant leakage.
- Check for oil stains, sign of a possible leak.
- Check that the refrigerant circuit shows the correct standing pressure on the pressure gauges (if present) otherwise use external ones.
- Check that the Shrader port caps are the correct type and are tightly closed.
- Check that crankcase heaters are powered correctly (if present).
- Check that all water connections are properly installed and all indications on unit labels are observed.
- The system must be flushed, filled and vented in order to eliminate any air.
- Check that the water temperatures are within the operation limits reported in the manual.
- Before start up check that all panels are replaced in the proper position and locked with fastening screws.

Do not modify internal wiring of the unit as this will immediately invalidate the warranty.

Crankcase heaters must be powered at least 12 hours before start up (pre-heating period) To do this, isolate the compressor(s), fans and pump(s) in the electrics box and then switch on the main isolator (heaters are automatically supplied when the main switch is closed). The crankcase heaters are working properly if, after several minutes, the compressor crankcase temperature is about 10÷15°C higher than ambient temperature.

During the 12 hours pre-heating period it is also important to check that the label OFF is shown on the display or that the unit is on stand-by mode. If there is an accidental start-up before the 12 hours pre-heating period has elapsed, the compressors could be seriously damaged and therefore the warranty will immediately terminate .

5.1.2 Safety device setting

Device		Set-point	Differential	Reset
Control thermostat (Heating mode)	°C	30	2	-----
Control thermostat (Cooling mode)	°C	23	2	-----
Anti-freeze thermostat	°C	4	4	MANUAL
High pressure switch (standard version)	Bar	42	7	Automatic for 3 times (than manual)
High pressure switch (CN version)	Bar	40.7	7	
Low pressure switch	Bar	5.7	1.3	
Water safety valve (Present in A versions only)	Bar	6	--	Automatic

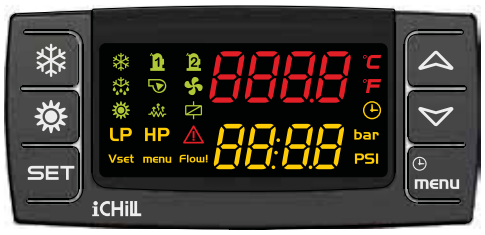
5.1.3 Controls during unit operation

- Check the rotation of the fans . If the rotation is incorrect, disconnect the main switch and change over any two phases of the incoming main supply to reverse motor rotation (only for units with three-phase fan motors).
- Check that user water inlet temperature is close to the set point of the control thermostat.
- For “A” version units (units with pumps and storage tank) if the pump is noisy, slowly close discharge shut-off valve until the noise is reduced to normal levels. This can occur when the system pressure drop substantially lower than the pump available pressure.

5.1.4 Refrigerant charge checking

- After several hours of operation, check that the sight glass has a green colour core: if the core is yellow moisture is present in the circuit. In this event it is necessary for dehydration of the circuit to take place. This must be performed by qualified people only. Check that there are no continuous vapour bubbles present at the sight glass . This would indicate a shortage of refrigerant. A few vapour bubbles are acceptable.
- Several minutes after start up and operating in cooling mode, check that condensing temperature is approximately 15 °C higher than the ambient air temperature.
- On cooling mode, check that the evaporation temperature is about 5 °C lower than the user water outlet temperature.
- On cooling mode check that the refrigerant superheat on the user heat exchanger is about 5-7 °C
- On cooling mode check that the refrigerant sub-cooling on the source heat exchanger is about 5-7 °C.

5.2 Description of the control panel



5.2.1 Icone del display

The instrument display is divided into three zones:
Left zone: the display shows the icons.
Top right zone: the display shows the inlet water temperature.
Bottom right zone: The display shows the temperature of water utilities in output or, in the version with condensation control, the pressure of evaporation / condensation.

Icon	Meaning	Icon	Meaning
°C	Celsius degrees		Electric heaters activated
bar	Bar		User water pump
1	Compressor 1	Flow!	Water flow alarm
2	Compressor 2		External fan
⚠	General Alarm		

5.2.2 Funzione dei tasti

menu	M makes it possible to enter the functions menu
SET	SET makes it possible to display or modify the set points . Selects a parameter or confirms a value in programming mode.
	In standard mode allows the display of the different temperatures 1 click: Bottom line displays Pb1: User inlet water temperature 2 clicks: Bottom line displays Pb2: User outlet water temperature 3 clicks: Bottom line displays Pb3: refrigerant pressure (high pressure in cooling, low pressure in heating mode) 4 clicks: Bottom line displays Pb4: Finned coil temperature (not used) In programming mode it allows the user to scroll through the parameter codes or to increase values.
	In standard mode it allows the display of the different temperatures in the opposite way to the above arrow. In programming mode it allows the user to scroll through the parameter codes or to decrease values.
	If press ed down for 5 seconds, it makes it possible to switch the unit on or off in chiller mode. Each time this function is activated, the green led positioned just above the button will be switched ON.
	If press ed down for 5 seconds, it makes it possible to switch the unit on or off in heating mode. Each time this function is activated, the green led positioned just above the button will be switched ON.

5.3 Remote control panel

5.3.1 Display icons

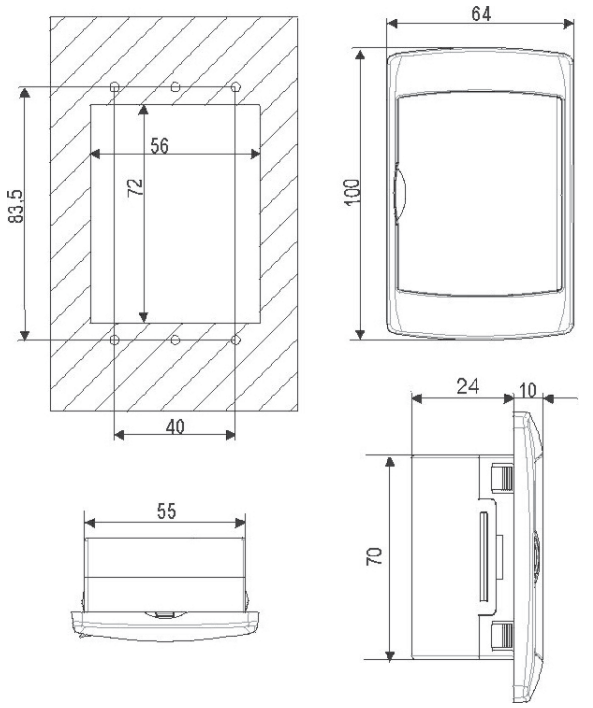
Icon	Meaning	Icon	Meaning
°C	Celsius degrees		Electric heaters activated
bar	Bar		User water pump
	Compressor 1	Flow!	Water flow alarm
	Compressor 2		External fan
	General Alarm		

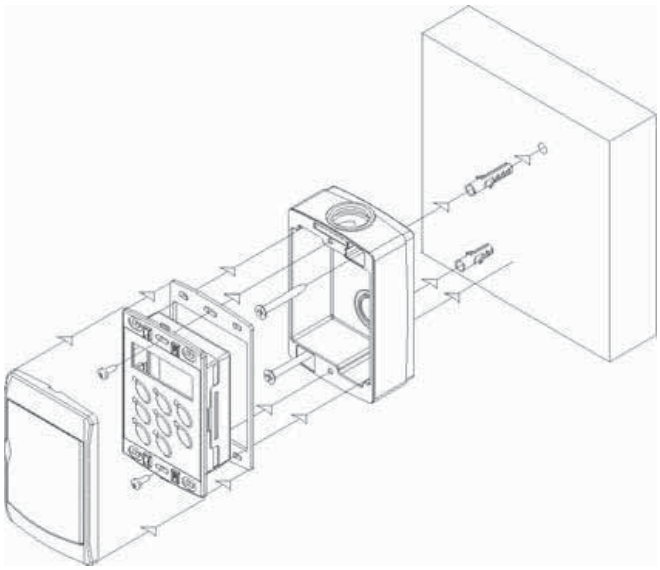
5.3.2 Key function

menu	M makes it possible to enter the functions menu
SET	SET makes it possible to display or modify the set points . Selects a parameter or confirms a value in programming mode.
	In standard mode allows the display of the different temperatures 1 click: Bottom line displays Pb1: User inlet water temperature 2 clicks: Bottom line displays Pb2: User outlet water temperature 3 clicks: Bottom line displays Pb3: refrigerant pressure (high pressure in cooling, low pressure in heating mode) 4 clicks: Bottom line displays Pb4: Finned coil temperature (not used) In programming mode it allows the user to scroll through the parameter codes or to increase values.
	In standard mode it allows the display of the different temperatures in the opposite way to the above arrow. In programming mode it allows the user to scroll through the parameter codes or to decrease values.
	If press ed down for 5 seconds, it makes it possible to switch the unit on or off in chiller mode. Each time this function is activated, the green led positioned just above the button will be switched ON.
	If press ed down for 5 seconds, it makes it possible to switch the unit on or off in heating mode. Each time this function is activated, the green led positioned just above the button will be switched ON.

5.3.3 Installation

The remote control panel is mounted on a panel with 72x56 mm cut-out, fixed with screw.
To obtain IP65 protection for the panel, use the rubber gasket RGW-V (optional). For wall mounting use the V-KIT plastic adapter as illustrated in the picture.





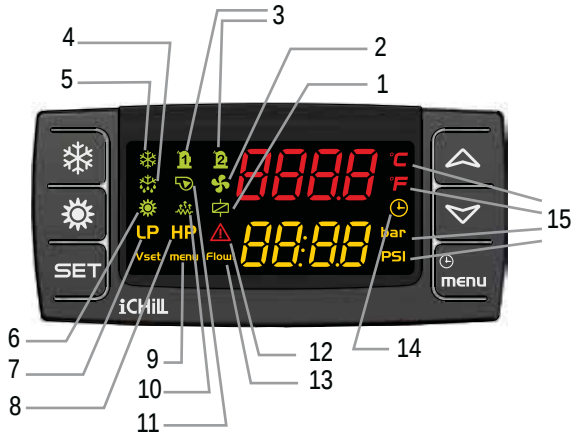
Electric data can be updated without notice. It is therefore necessary to always refer to the wiring diagram provided in the unit.

If there is damage to the remote control or there is a faulty connection, failure of communication will be indicated in the display with the message “noL” (no link).

6. USE

6.1 Switch the unit on

In order to power the unit, turn the main switch to the ON position. The display shows the User inlet water temperature.



Legend

1	Icon on if the open collector outlet is active.	9	Function menu active.
2	Icon ON (acceso): if the fans are running.	10	Integrative user circuit heaters activated.
3	Icon On if the compressor is turned on; Icon blinking if the compressor is in the ignition timing.	11	Icon on if at least one of the 2 water pumps (pump evaporator or pump condensator) is on.
4	Icon blinking: Defrost cycle timeout activated; Led ON: Defrost cycle activated.	12	Icon blinking on alarm.
5	Icon ON: Unit in cooling mode.	13	Icon blinking if the digital input of the flow switch is active (both pump ON and pump OFF).
6	Icon ON: Unit in heating mode.	14	Icon on when the bottom display show current time, the hours of operation of the loads, etc.
7	Icon blinking if low pressure alarm is active.	15	Icon on when the display show a temperature or a pression.
8	Icon blinking if high pressure alarm is active.		

6.1.1 Cooling mode

To start the unit in heating mode, press the key. The snowflake icon is on. If requested, the compressor safety delay countdown starts and the compressor icon flashes. The water pump will be activated after few seconds and then, once the compressor countdown has finished, the compressor starts and the icon remains on. The display shows the user water inlet temperature.

6.1.2 Heating mode

To start the unit in heating mode, press the key . The sun icon is on. If requested, the compressor safety delay countdown starts and the compressor icon flashes. The water pump will be activated after few seconds and then, once the compressor countdown has finished, the compressor starts and the icon remains on. The display shows the user water inlet temperature.

6.2 Stop

6.2.1 Cooling mode

To stop the unit in cooling mode, press the key. The LED switches off. The unit goes into stand-by mode.

6.2.2 Heating mode

To stop the unit in heating mode, press the key. The LED switches off. The unit goes into stand-by mode.

6.3 Stand-by

When the unit is switched off from the keyboard or the remote panel, it goes into standby mode. In this mode, the microprocessor control displays the sensor readings and is also able to manage alarm situations. The only visible signal on the display is the green led of circuit1 and the water temperatures. If the unit is switched off from remote ON/OFF the label OFF is displayed.

If it is required to switch the unit on and off, never do this using the main isolator: this should only be used to disconnect the unit from the power supply when the unit is to be permanently off. Isolation will result in no supply for the crankcase heater and on start up the compressor could be seriously damaged.

6.4 How to change the set points

When modifying or varying the machine's operating parameters, make sure that you do not create situations that conflict with the other set parameters.

The complete display of the 2 set points (heating, cooling) is ONLY available when the unit is in stand-by mode. It is suggested to put the unit in stand by when modifying set points. If the unit is not in stand-by, the only editable parameters are the ones related to the operation mode of the unit (eg. In heating mode it is only possible to change the heating and set points, in cooling mode it is only possible to change the cooling and set points.)

Select the required set point using the Press the SET key . The label appears at the bottom of the display:
SEtH Heating set point
SEtC Cooling set point.

To set the required set-points press again the SET for 3 seconds.

The current value flashes at the top and can be modified using the , keys we can modify the parameter.

Then press the SET key to memorise the parameter and exit.

All set points are intended as return temperature from the plant. For example: if hot water at 45°C is required and the Δt is 5°C, than the set point will be 40°C. If the Δt is 8°C, then the set point has to be set at 37°C. If, for example, cold water is required at 15°C and the Δt is 5°C, then the set point will be 20°C. If the Δt is 8°C, then the set point has to be set at 23°C.

6.4.1 Adjustable parameters

The adjustable set points that can be modified by the end user are:

Label	Function	Adjustment limit	Default value
SEt H	Heating set-point	20÷55°C	40°C
SEt C	Cooling set-point	10÷23°C	12°C
PAS	Password	(Contact the company)	

The units are supplied with a very sophisticated control system with many other parameters that are not adjustable by the end user; these parameters are protected by a manufacturer password.

6.5 Parameters list

By pressing the menu key the user has the possibility to display many parameters.

Scroll the list of the parameters using the , keys, then press the SET key to display the required one. In this menu it is only possible to display the parameters, it is not possible to change any value. The parameter list is:

Display	List	Symbol	Meaning
ALrM	Alarm List	ALrM	See following paragraph
ALOG	Alarm history	ALOG	See following paragraph
HouR	Main components working hours	C1HR	Working hours compressor 1
		C2HR	Working hours compressor 2 (only models with 2 compressors)
		PFHR	Working hours user water pump
		PCHR	Working hours domestic hot water pump
DEF	(Not used)	dF1	Countdown (in seconds) to the next defrost cycle; the countdown is active if the defrost led is blinking. In case the defrost led is off the defrost cycle is not required. During the defrost cycle the defrost led is ON.

6.6 Acoustic signal silencing

Pressing and releasing one of the keys; the buzzer is switched off, even if the alarm condition remains in place.

6.7 Alarm reset

Press the menu key (the menu AlrM appears at the bottom right of the display). Press the SET key to display the alarm event. In case of multiple alarms use the using the , keys, to scroll through the list of the active alarms.

There are two types of alarms:

Reset alarms:
RST label appears on the upper part of the display. In this case press the SET key to reset.

Non reset alarms:
nO label appears on the upper part of the display. In this case the alarm is permanent; contact technical support.

6.8 Display alarm history

Press the menu key, then the ▲ , ▼ keys, to scroll through the menus, when ALOG label appears in the bottom part of the display, press SET . To scroll the list of alarms use the ▲ , ▼ keys.

7. MAINTENANCE OF THE UNIT

7.1 General warnings

Starting from 01/01/2016 the new European Regulation 517_2014, “Obligations concerning the containment, use, recovery and destruction of fluorinated greenhouse gases used in stationary refrigeration, air conditioning and heat pumps”, became effective. This unit is subject to the following regulatory obligations, which have to be fulfilled by all operators:
(a) Keeping the equipment records
(b) Correct installation, maintenance and repair of equipment
(c) Leakage control
(d) Refrigerant recovery and disposal management
(e) Presentation to the Ministry of the Environment of the annual declaration concerning the atmospheric emissions of fluorinated greenhouse gases.

Maintenance can:

- Keep the equipment operating efficiently
- Prevent failures
- Increase the equipment life

It is advisable to maintain a record book for the unit which details all operations performed on the unit as this will facilitate troubleshooting.

Maintenance must be performed in compliance with all requirements of the previous paragraphs.

Use personal protective equipment required by regulations as compressor casings and discharge pipes are at high temperatures. Coil fins are sharp and present a cutting hazard.

If the unit is not to be used during the winter period, the water contained in the pipes may freeze and cause serious damage. In this event, fully drain the water from the pipes, checking that all parts of the circuit are empty including any internal or external traps and siphons.

7.2 Drive access

Access to the unit once installed, should only be possible to authorized operators and technicians. The owner of the equipment is the company legal representative, entity or person owns the property where the machine is installed.
They are fully responsible for all safety rules given in this manual and regulations. If it is not possible to prevent access to the machine by outsiders, a fenced area around the machine at least 1.5 meters away from external surfaces in which operators and technicians only can operate, must be provided.

7.3 Periodical checks

The start-up operations should be performed in compliance with all requirements of the previous paragraphs.

All of the operations described in this chapter MUST BE PERFORMED BY TRAINED PERSONNEL ONLY. Before commencing service work on the unit ensure that the electric supply is disconnected. The top case and discharge line of compressor are usually at high temperature. Care must be taken when working in their surroundings. Aluminium coil fins are very sharp and can cause serious wounds. Care must be taken when working in their surroundings. After servicing, replace the cover panels, fixing them with locking screws.

7.3.1 Every 6 months:

It is advisable to perform periodic checks in order to verify the correct working of the unit.
- Check that safety and control devices work correctly as previously described.
- Check all the terminals on the electric board and on the compressor are properly fixed.
- Check and clean the sliding terminals of the contactors.
- Check for water leaks in the hydraulic system.
- Check correct operation of the flow switch and clean the strainers on the pipework.
- Check the compressor crankcase heater has the proper supply and is functioning correctly.
- Check the state of the finned coil, removing any debris or leaves. If possible, use compressed air to blow through in the opposite direction to the airflow. If the coil is heavily clogged, clean it with a low pressure washer, taking care to avoid damaging the aluminium fins.
- Check the state of the finned coils metallic filters (Optional), removing any debris or leaves. If possible, use compressed air to blow through in the opposite direction to the airflow. If the coil is heavily clogged, clean it with a low pressure washer, taking care to avoid damaging the aluminium fins.
- Check mounting of fan blades and their balancing.
- Check the colour of the sight glass core (green=no moisture, yellow=moisture present): if it has a yellow colour, change the refrigerant filter.

7.3.2 End of seasons or unit switched off:

If the unit is to be left out of commission for a long period, the hydraulic circuit should be drained down. This operation is compulsory if the ambient temperature is expected to drop below the freezing point of the fluid in the circuit (water or Glycol mix).

7.4 Refrigerant circuit repair

If the refrigerant circuit is to be emptied, all the refrigerant must be recovered using the correct equipment.

For leak detection, the system should be charged with nitrogen using a gas bottle with a pressure reducing valve, until 15 bar pressure is reached. Any leakage is detected using a bubble leak finder. If bubbles appear discharge the nitrogen from the circuit before brazing using the proper alloys.

Never use oxygen instead of nitrogen: explosions may occur.

Site assembled refrigerant circuits must be assembled and maintained carefully, in order to prevent malfunctions.

Therefore:
- Avoid oil replenishment with products that are different from that specified and that are pre-loaded into the compressor.

- In the event of a gas leakage on machines using refrigerant R410A, even if it is only a partial leak, do not top up. The entire charge must be recovered, the leak repaired and a new refigerant charge weighed in to the circuit.
- When replacing any part of the refrigerant circuit, do not leave it exposed for more than 15 minutes.
- It is important when replacing a compressor that the task be completed within the time specified above after removing the rubber sealing caps.
- When replacing the compressor following a burn out, it is advisable to wash the cooling system with appropriate products including a filter for acid.
- When under vacuum do not switch on the compressor.

8. DECOMMISSIONING

8.1 Disconnect the unit

All decommissioning operations must be performed by authorized personnel in accordance with the national legislation in force in the country where the unit is located.

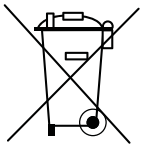
- Avoid spills or leaks into the environment.
- Before disconnecting the machine please recover:
  - the refrigerant gas;
  - Glycol mixture in the hydraulic circuit;
  - the compressor lubricating oil.

Before decommissioning the machine can be stored outdoors, providing that it has the electrical box, refrigerant circuit and hydraulic circuit intact and closed.

8.2 Disposal, recovery and recycling

The frame and components, if unusable, should be taken apart and sorted by type, especially copper and aluminum that are present in large quantities in the machine.
All materials must be recovered or disposed in accordance with national regulations.

8.3 RAEE Directive (only UE)



- The RAEE Directive requires that the disposal and recycling of electrical and electronic equipment must be handled through a special collection, in appropriate centers, separate from that used for the disposal of mixed urban waste.
- The user has the obligation not to dispose of the equipment at the end of the useful life as municipal waste, but to send it to a special collection center.
- The units covered by the RAEE Directive are marked with the symbol shown above.
- The potential effects on the environment and human health are detailed in this manual.
- Additional information can be obtained from the manufacturer.

9. DIAGNOSIS AND TROUBLESHOOTING

9.1 Fault finding

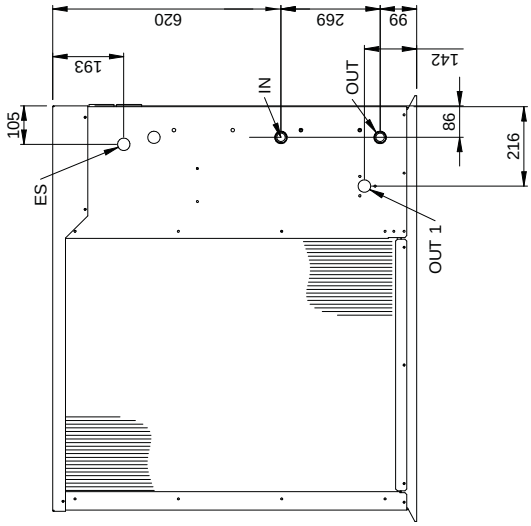
All units are checked and tested at the factory before shipment, however, during operation an anomaly or failure can occur.

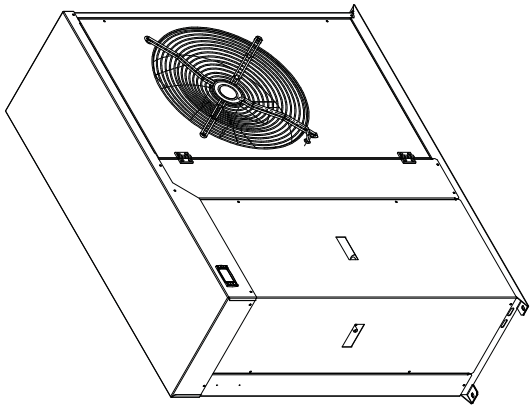
BE SURE TO RESET AN ALARM ONLY AFTER YOU HAVE REMOVED THE CAUSE OF THE FAULT; REPEATED RESET MAY RESULT IN IRREVOCABLE DAMAGE TO THE UNIT.

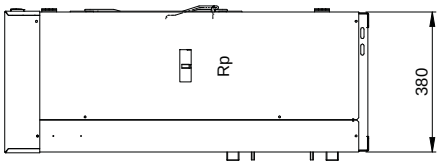
Code	Alarm Description	Cause	Solution
P1	Alarm Sensor PB1	Wrong electrical connections. Sensor defect.	Check the electrical connection of the sensor to theterminal board, if correct call the service to replace the sensor.
P2	Alarm Sensor PB2		
P3	Alarm Sensor PB3		
P4	Alarm Sensor PB4		
A01	High pressure switch alarm.	In heating mode: Insufficient user circuit water flow; In heating mode: Insufficient air flow at the source fan.	Restore the correct circuit water flow. Restore the correct air flow at the source fan.
A02	Low pressure switch alarm.	Refrigerant charge leakage.	Find leakage and repair.
A05	High pressure alarm.	Trasducer defect.	Replace the faulty transducer.
A06	Low pressure alarm.	Refrigerant charge leakage.	Find leakage and repair.
A07	Anti-freeze alarm from analog input.	Too low water temperature.	Check user temperature set point. Check user water flow.
A08	Source heat exchanger flow switch alarm. (air/water water/water unit)	Presence of air or dirtiness in the user hydraulic system.	Bleed carefully the user hydraulic system or check and clean the water service.
A09	Compressor 1 overload.	Compressor input current putside operation limits.	Contact the Company.
A10	Compressor 2 overload.		
A11	Overload source fan alarm.	Fan input current outside operation limits.	Check the proper operation of the source fan and, in case, replace it.
A12	Error alarm in defrosting.	Defrost time too long. Outside temperature outside the working limits. Refrigerant chearge leakage.	Check defrost set point. Restore normal working conditions. Find leakage and repair.
EE	EEPROM Alarm	Severe hardware damage in the microprocessor control system.	Switch the unit OFF and, after few seconds switch the unit ON; if the alarm appears again contact the service.

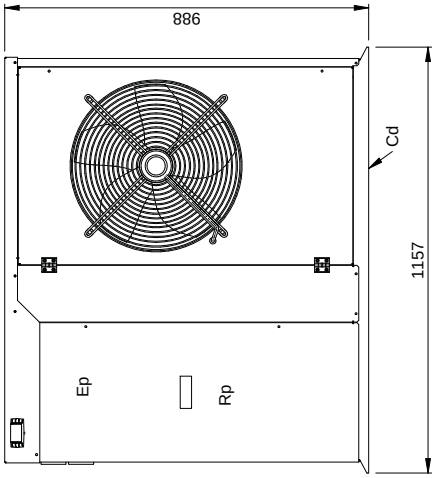
10.DIMENSIONAL DRAWINGS

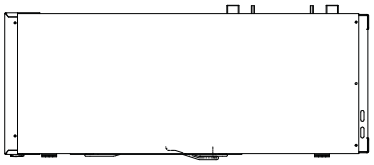
06 - 10

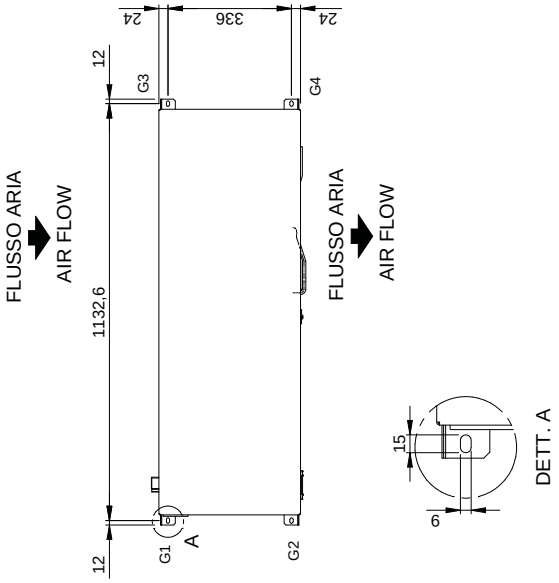








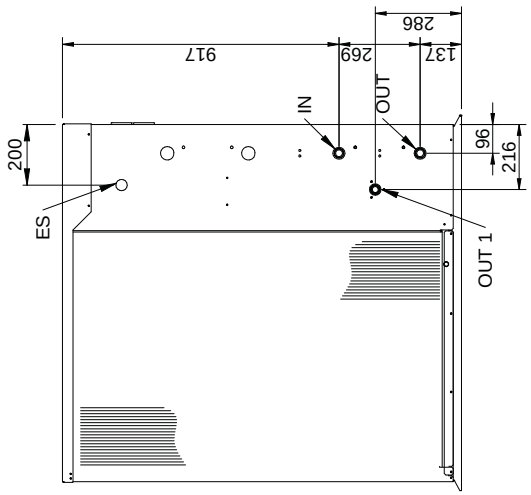


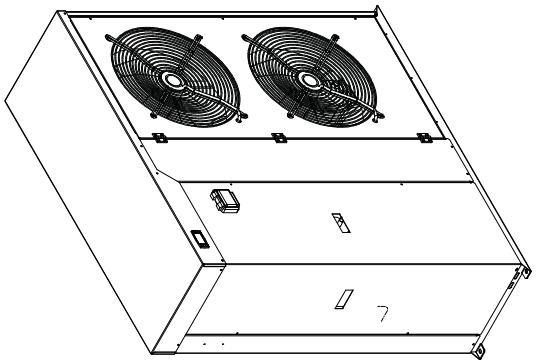


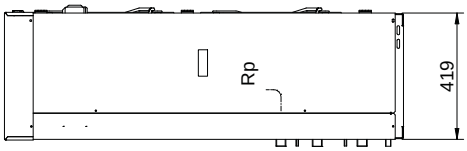
WEIGHT OF THE UNIT OPERATION					
06-08-10		06-08-10 A1+Tank			
118 Kg		180 Kg			
POS.	WEIGHT (Kg)	POS.	WEIGHT (Kg)		
G1	35	G1	45		
G2	35	G2	45		
G3	24	G3	45		
G4	24	G4	45		

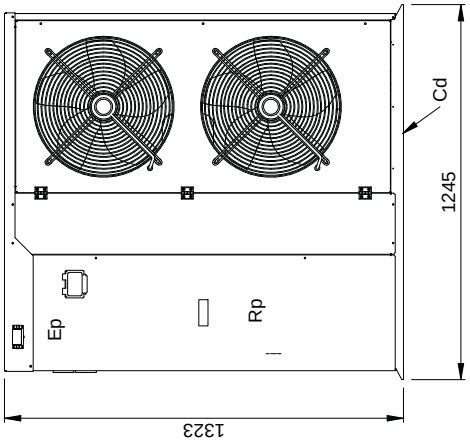
Rp	REMOVABLE PANEL
Ep	ELECTRICAL PANEL
Es	INPUT POWER
Cd	CONDENSATE DRAIN
IN Ø 1" M	WATER INLET
OUT Ø 1" M	WATER OUT (STANDARD VERSION)
OUT 1 Ø 1" M	WATER OUT ("A" VERSION)

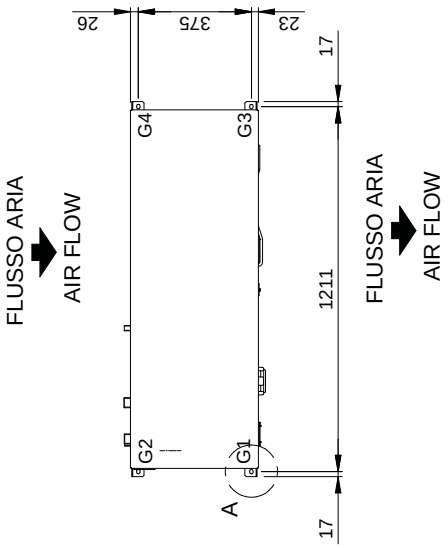
14 - 16

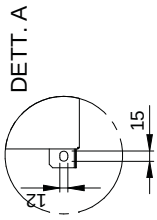


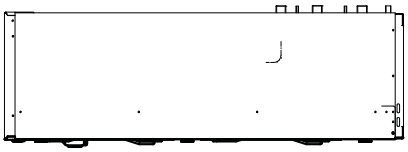








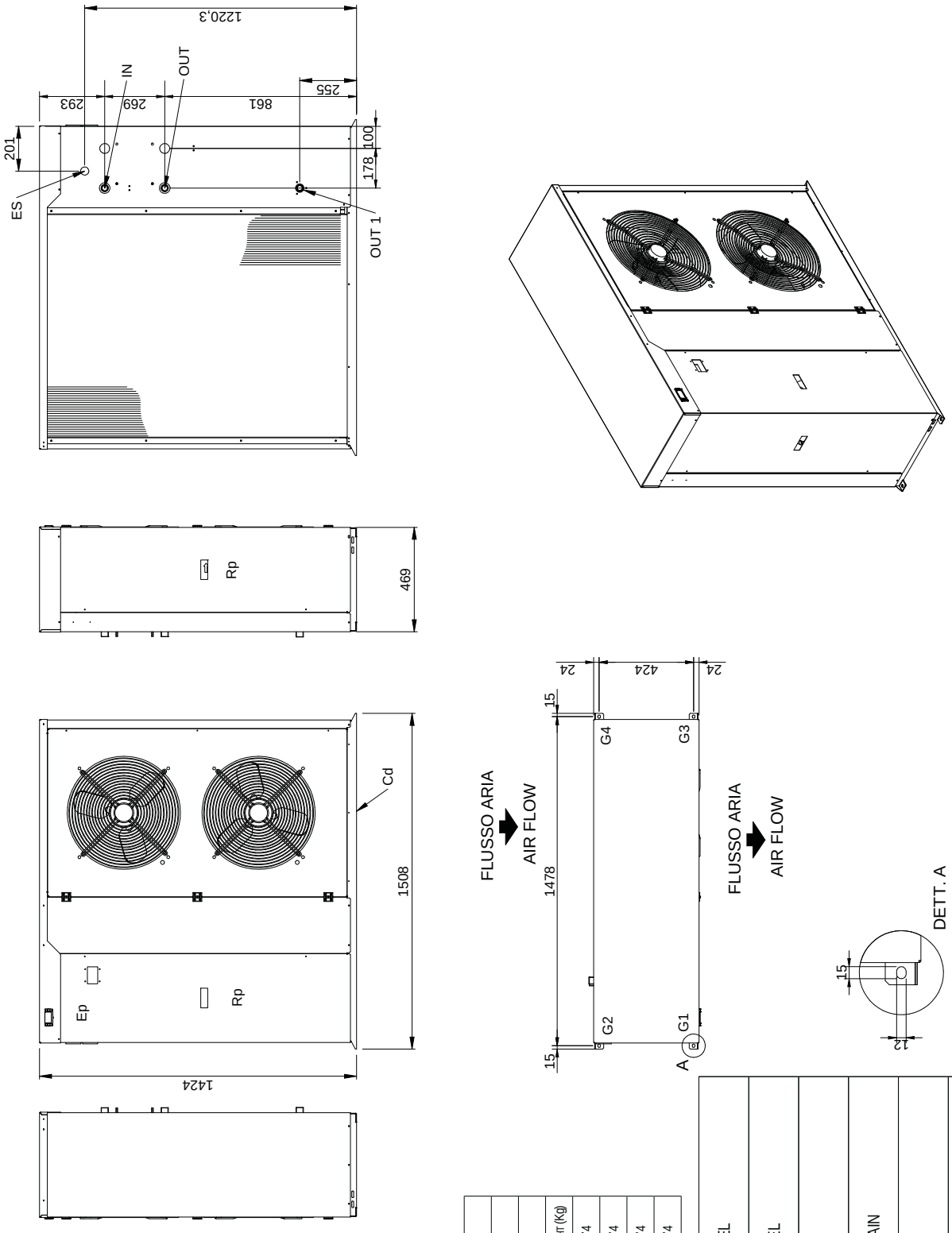




WEIGHT OF THE UNIT OPERATION							
14-16		14-16 A1+Tank					
134 Kg		212 Kg					
POS.	WEIGHT (Kg)		POS.	WEIGHT (Kg)			
G1	38		G1	53			
G2	38		G2	53			
G3	29		G3	53			
G4	29		G4	53			

Rp	REMOVABLE PANEL
Ep	ELECTRICAL PANEL
Es	INPUT POWER
Cd	CONDENSATE DRAIN
IN Ø 1" M	WATER INLET
OUT Ø 1" M	WATER OUT (STANDARD VERSION)
OUT 1 Ø 1" M	WATER OUT ("A" VERSION)

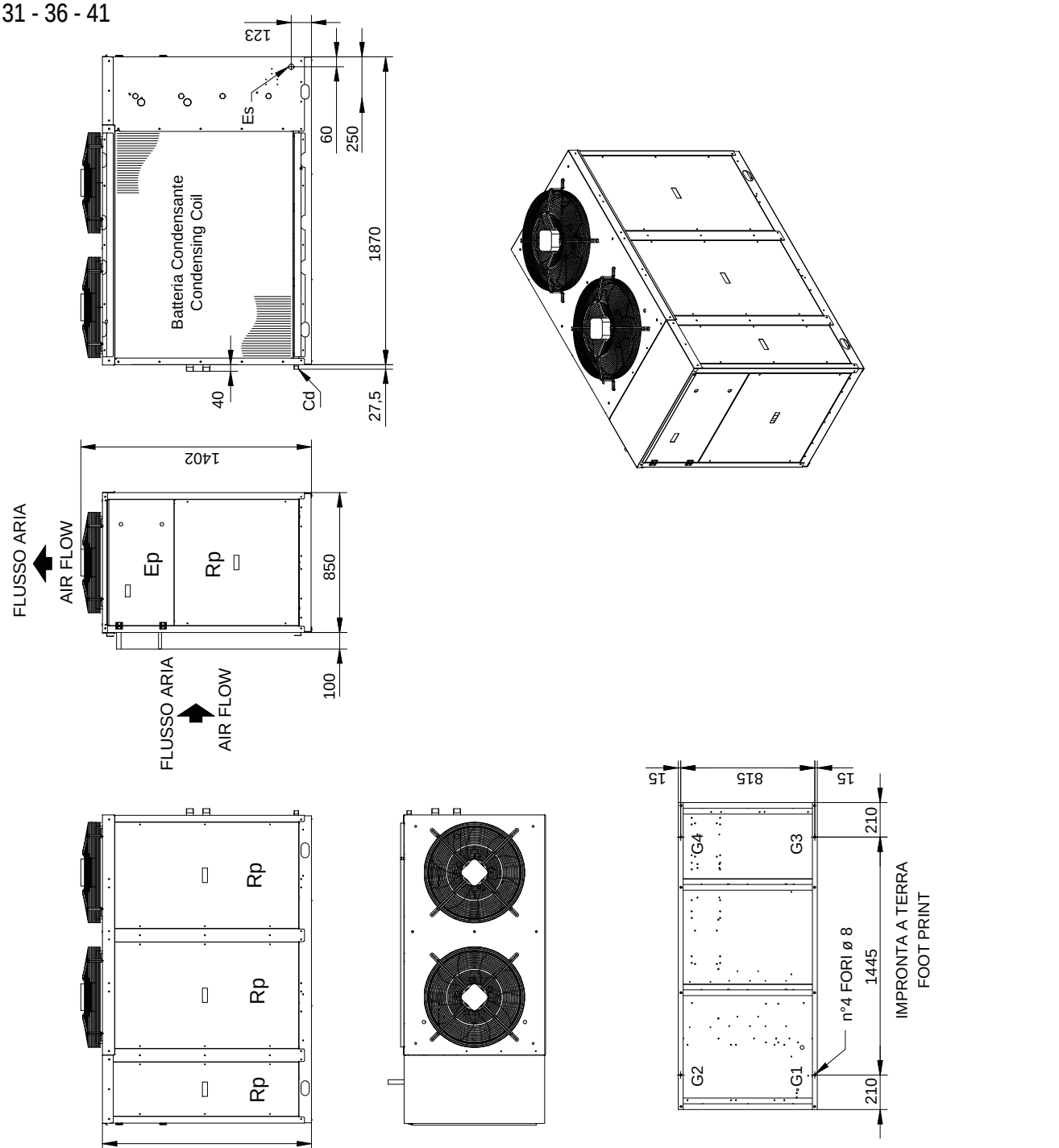
21 - 26



WEIGHT OF THE UNIT OPERATION					
21-26	21-26 A1+Tank				
218 Kg	296 Kg				
POS.	WEIGHT (Kg)	POS.	WEIGHT (Kg)		
G1	63	G1	74		
G2	63	G2	74		
G3	46	G3	74		
G4	46	G4	74		

Rp	REMOVABLE PANEL
Ep	ELECTRICAL PANEL
Es	INPUT POWER
Cd	CONDENSATE DRAIN
IN Ø 1" M	WATER INLET
OUT Ø 1" M	WATER OUT (STANDARD VERSION)
OUT 1 Ø 1" M	WATER OUT ("A" VERSION)

31 - 36 - 41



WEIGHT OF THE UNIT OPERATION						
31-41		31-41 A1+Tank				
360 Kg		520 Kg				
POS.	WEIGHT (Kg)	POS.	WEIGHT (Kg)	POS.	WEIGHT (Kg)	
G1	110	G1	110	G1	110	
G2	110	G2	110	G2	110	
G3	70	G3	150	G3	150	
G4	70	G4	150	G4	150	

Rp	REMOVABLE PANEL
Ep	ELECTRICAL PANEL
Es	INPUT POWER
Cd	CONDENSATE DRAIN
IN Ø 1"1/4	WATER INLET
OUT Ø 1"1/4	WATER OUTLET

ENEX TECHNOLOGIES

VIA DELLE INDUSTRIE, 7 • CAP 31030 • VACIL DI BREDA DI PIAVE (TV)
TEL. +39 0422 605 311

Info@enextechnologies.com • www.enextechnologies.com